Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves

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Volume 69
Number 10

CHICAGO, SATURDAY, SEPTEMBER 4, 1915

Subscription—10 Cents a Copy
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THE MEANING OF "SERVICE FIRST."

"Service First" means Greater Service, a Greater Number of Subscribers, Greater Harmony and Co-Operation, as well as Greater Efficiency.

Slogans and Mottoes.

It was not so very many years ago that the importance of the selection of a life motto was urged upon every young man starting upon his lifework. A motto is defined as "a short, suggestive expression of a guiding principle." In the last few years the motto has been taken up by public utility companies in the way of slogans.

Those which are now favorites with telephone companies are "Safety First" and "Service First." The former is particularly pertinent to the construction, installation and maintenance forces, while the latter applies to all branches, particularly those having to do with operating. Some companies have adopted only one slogan, "Service First." They reason that this includes that of "Safety First," as the best service can only be rendered when conditions conducive of accidents are absent.

It would seem, however, that the "Safety First" movement should be given a distinct place in the construction, installation and maintenance departments. It has been found that practically 17 per cent. of all accidents are due to slipping, tripping and falling, and that 42 per cent. of them occur in the handling of tools and materials. An investigation of some 8,000 accidents showed them to be due to the following four big causes: Workmen falling from high places; tools, or material falling on the workmen; workmen dropping heavy parts; and the improper handling of tools. It is to be noted that guards could have prevented but few of these accidents, as they were due entirely to the personal actions of the workmen.

The remedy for reducing accidents to a minimum, therefore, lies largely with the employes. The workmen must become interested to make the "Safety First" movement a success. Educational methods must be used to show the probable results of careless working methods.

An incident occurred recently which demonstrates the value of safety first. A certain 87-foot pole at a river crossing had been in use for over six years and was not in good condition. As a safety precaution, the company foreman erected a pole by the side of the old one, binding them together. Shortly afterwards the old pole broke about 20 feet from the ground and but for the additional pole would have carried the cable into the river. The "Safety First" precaution therefore was also "Service First."

Many public utility companies, including telephone companies, have organized "Safety First" clubs to further the movement. Members are provided with buttons bearing the company emblem, having the words "Safety First" prominently displayed upon them. The foremen are provided with special gold buttons, as are also the officers of the club. The other members as they perform some notable service in the interests of the "Safety First" movement, are given the higher class buttons. There is thus a desire created to become the possessor of the more prized button.

The "Safety First" movement among employes has resulted in a very considerable decrease in accidents. It has caused men to think where formerly they acted automatically. They have learned that the "Safety First" movement is for them and by them and that personal caution is the greatest safeguard after all.

The "Safety First" movement has gained many adherents among telephone companies, both Independent and Bell. The Kansas Independent Telephone Association is one of the associations that has made a practice of boosting for "Service First." The "Service First" membership emblems which it has issued have undoubtedly done much to make this slogan popular in Kansas.

These two slogans "Safety First" and "Service First", are mottoes for every telephone company to consider. They are truly "short, suggestive expressions of guiding principles."

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like the trees are anchored below the ground. They are flexible and give to extreme forces from below the ground upwards, the ground resistance acting as a cushion, while the wood pole is dead and non-responsive.

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SEP 6 1915
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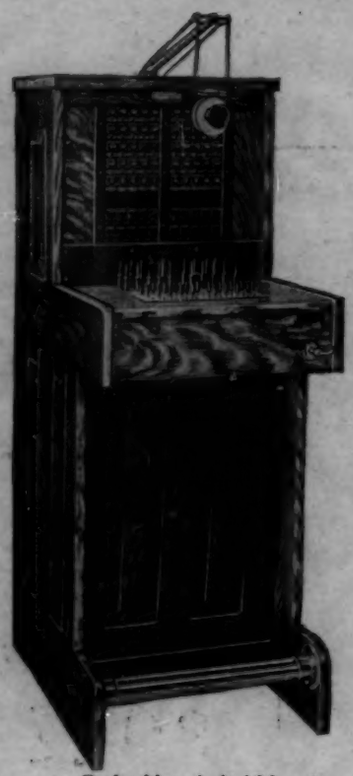
SWITCHBOARDS



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BE SURE OF YOUR DROP. No other drop contains so many essential features.

A FIXED POLE PIECE AND PERMANENT ARMATURE ADJUSTMENT, insuring the highest efficiency and greatest sensitiveness regardless of any variations in the length of the spool core.

REMOVABLE COIL AND SHELL, permitting examination of jack springs without removing drop strip from the board.

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The Jack ferrules can be removed from the front of the board.

Compare this drop with a drop having the armature pull directly against the spool core, where a few thousandths of an inch difference in the length or fit of the core in the shell will make a big difference in sensitiveness and efficiency.

We manufacture Magneto Switchboards in all sizes up to 1200 lines.

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Sole Manufacturers of North Magneto and Common Battery Manual Apparatus

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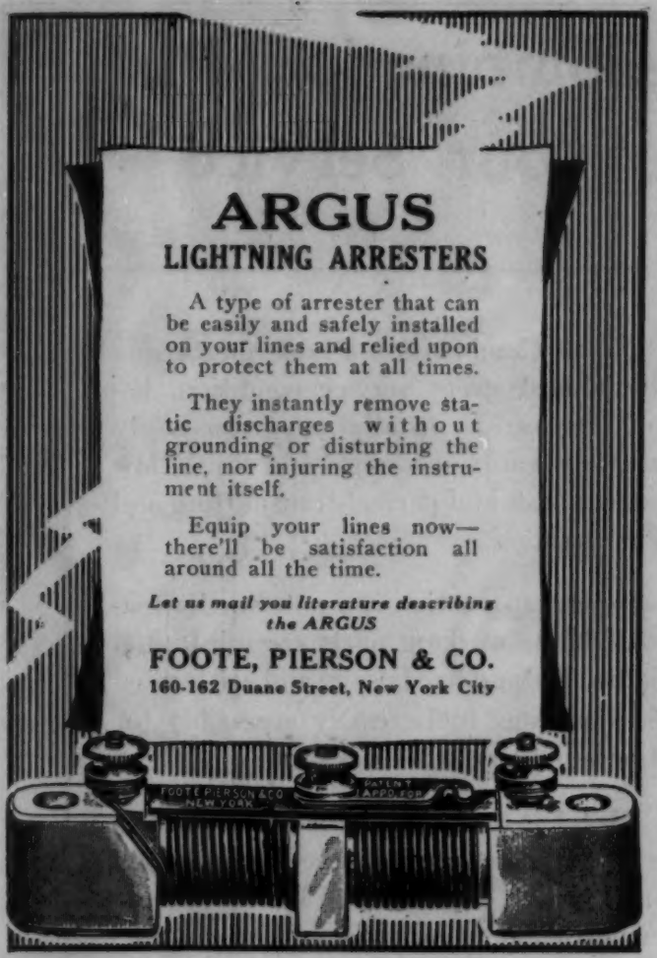
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When we say that

RUNZEL-LENZ TELEPHONE CORDS

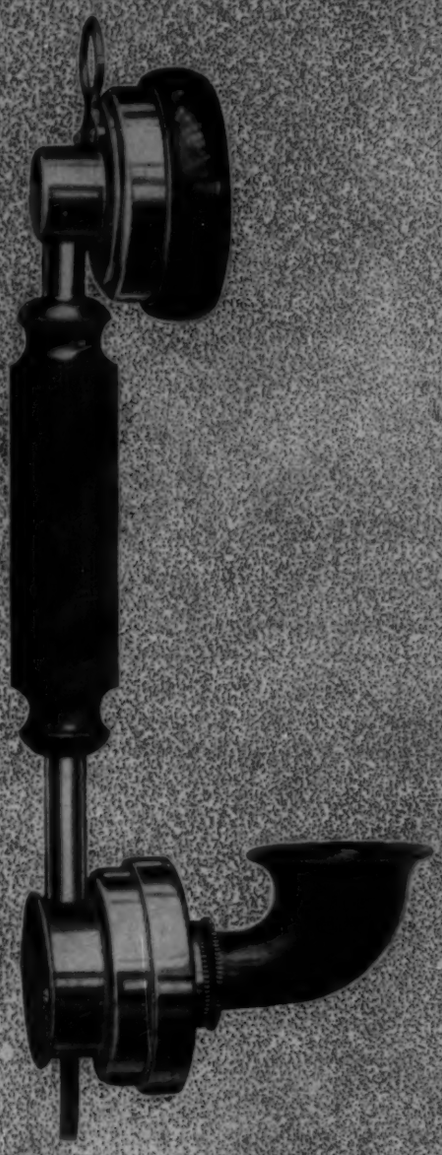
are the most economical, as well as the most satisfactory; that they keep their friends year after year because of excellent service; and that they are the standard for hundreds of telephone companies——

We have stated briefly the three biggest reasons why you should buy them.

RUNZEL-LENZ ELECTRIC MFG. CO.
1751-1753 N. Western Ave., Chicago

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

The Handy No. 9 Combination Phone Will Popularize Your Service



¶ The No. 9 Combination Phone meets successfully almost every service condition, because of its ease of installation, exceedingly light weight, beauty in design and finish, low maintenance cost, and perfect transmitting and receiving qualities.

¶ Its simple construction is a noteworthy feature. All of the working parts are substantial enough to withstand hard usage and are located in such a way as to be easily accessible for inspection purposes.

¶ For Hotel installations and for extension service we can conceive of no better type than this handy No. 9 Combination Phone. It occupies very little mounting space and is an attractive addition to the furnishings in any room.

¶ The triplet box from which this little wonder telephone is suspended, when not in use, is made of punched metal, black enameled. In this triplet box are contained the induction coil, hookswitch and line terminals.

¶ Booklet No. 469 tells all about the details of the construction, and several plans are suggested whereby a telephone company can use this instrument as a means for securing new subscribers and to increase its extension phone business. A copy of this booklet will be sent free, upon request.

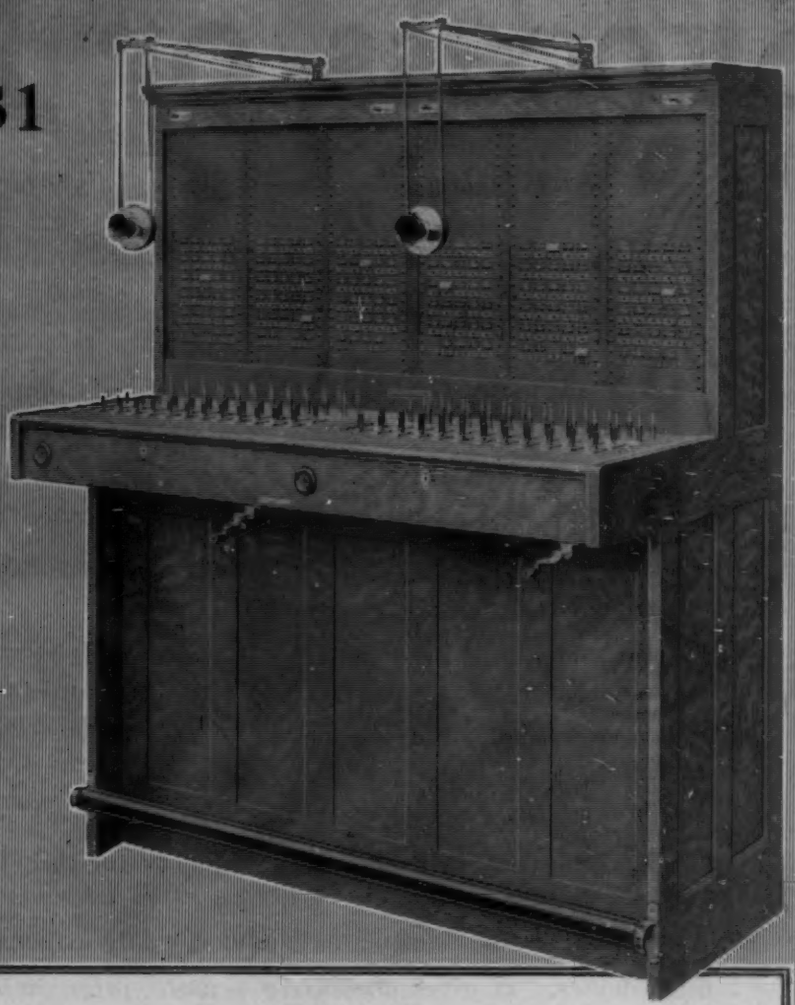
Stromberg-Carlson Tel. Mfg. Co.

Rochester, New York

Chicago, Ill. Toronto, Can.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

The No. A-5631 Two Position Magneto Switchboard For Fast Service At Low Cost



Subscriber—pleasing service and the cost of furnishing it are matters of utmost importance to the telephone company about to purchase a new switchboard.

Buying the lowest priced board offered is not true economy. A low priced switchboard cannot have the sterling worth which is found in a board designed to give steady day in and day out service necessary to hold the good will of your subscribers.

The No. A-5631 two-position type was designed primarily to render lasting and dependable service rather than to sell for a minimum amount.

The apparatus is reliable. No difficulty will be experienced by your subscribers in getting the operator when the board is used. The maintenance cost is low, the first cost is practically the only cost.

We should be glad to furnish you with further details. Writing us places you under no obligation.

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Success or Failure

In the Telephone business, success or *failure* hinges on SERVICE.

We see many GOOD Telephone Companies fail through poor service through the use of obsolete equipment.

We see many ORDINARY Telephone Companies making a *grand success* by giving their subscribers "bang-up" service with modern equipment.

Any device that betters the quality of service now being rendered, performs a most valuable, economic function, and is a welcome addition to the list of modern telephone improvements.

The Lock-Out is the latest success in the up-to-date Telephone exchange. It is *here to stay,*—because it pays its way.

The Adsit Lock-Out gives new life to "dead" Companies and insures instant popularity and continued prosperity for the "live" organization.

The Adsit is a simple little device, easily attachable to your present bridging 'phones. It gives *absolutely private, intercommunicating service,* on any party or rural line.

To supply private service on rural party lines through the medium of a moderate priced, reliable attachment, fulfills *the longest felt want* in the telephone world.

The Adsit Lock-Out is also the means of bringing financial aid to any company installing it—thereby increasing *revenue* as well as *service.*

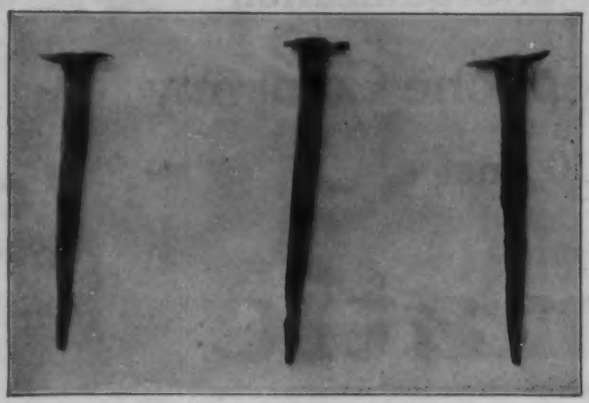
The Lock-Out problem is *solved.* The practical Lock-Out *is here.* There was a time when you were justified in awaiting developments—to see it tried on "the other fellow's" dog. But, *that* time is past.

Get busy! Be the first in your field to supply this new type of private service on your party lines. Get *your* place in the Sun NOW.

Adsit General Electric Company

McKnight Building **Minneapolis, Minn.**

Pure Iron Nails



Made in the Days of Salem Witchcraft In Service 228 Years and as Good as New

The old "Wayside Inn" of Sudbury, Massachusetts, made famous by the Poet Longfellow, was erected in 1686. The methods and materials employed were those of a people who built for the future.

Some of the iron nails which had held the original clapboards, and which were therefore 228 years old, were recently extracted, and found in almost perfect condition. These being subjected to exact analysis, were found to contain only seven-thousandths of one per cent of Sulphur, five-hundredths of one per cent of Carbon, two-thousandths of one per cent of Manganese, and the merest trace of Copper.

It is undoubtedly due to the practical exclusion of these elements that the iron has given such splendid service.

Iron of a higher total purity than that secured by the old-time puddling process was not commercially available until the development of

ARMCO American Ingot IRON

This is the purest, most even and most carefully manufactured iron on the market, and therefore the most durable in exposed situations.

ARMCO IRON Resists Rust

For Roofs, Pipes, Transformer Tanks, Guy Anchor Rods, Cross Arm Braces and other Pole Line Supplies, this material represents true economy. The nearer the approach to 100% purity the greater the resistance to rust. Armco Iron is guaranteed to be at least 99.84% pure iron. The Rods of Matthews Scrulix Anchors, made by W. N. Matthews & Bro., Inc., of St. Louis, are of Armco Iron. They are guaranteed for long and efficient service.

The trademark **ARMCO** carries the assurance that iron bearing that mark is manufactured by The American Rolling Mill Company with the skill, intelligence and fidelity associated with its products, and hence can be depended upon to possess in the highest degree the merit claimed for it.

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During its first year of organization

The Ohio State Telephone Company

ordered 7,500 lines of

Automatic Telephone Equipment

Part of this is for additions to existing automatic exchanges; part displaces manual switchboards operating in four cities.

The men who placed these contracts have been operating automatic plants for the past ten years.

Their experience proves its efficiency.

Their records show its economy.

The truest endorsement is a "Repeat Order"

Automatic Electric Company

Chicago

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YOU WILL BUY MATTHEWS SCRULIX ANCHORS

If You Want the Best At the Lowest Cost Installed

The Size is on the Eyes

MATTHEWS AMERICAN ARMCO INGOT IRON RODS

LOOK FOR SCRULIX ON THE HELIX

Matthews Guarantee

W. N. Matthews and Brother, Inc., of St. Louis, absolutely guarantee the ungalvanized 5, 6 and 7-inch Matthews Scrulix Anchors to outlast any other anchors using galvanized steel rods of the same cross section and they guarantee the ungalvanized 8, 10 and 12-inch Matthews Scrulix Anchors with square rods to outlast the same round section galvanized.

W. N. Matthews
President

Claude L. Matthews
Secretary

The Size is on the Eyes

MATTHEWS AMERICAN ARMCO INGOT IRON RODS

LOOK FOR SCRULIX ON THE HELIX

You Can't Lose

If by any chance any Matthews Scrulix Anchors are received by you that are broken—or if your men break them before or during installation, we will replace them free of cost to you.

The threads in the eyes and helices of the 5, 6 and 7 inch Matthews Scrulix Anchors are rolled threads and they are guaranteed to be equal in strength to the rods to which they are attached.

YOU CAN'T LOSE BY SPECIFYING SCRULIX ON YOUR ORDERS

Your Jobber Now Has Them In Stock

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Install Kellogg

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"We have a great number of Kellogg Intercommunicating systems in this city and they are proving a real economy to our subscribers and a sure revenue to us."

"We find them reliable and in every way satisfactory."

Kellogg Inter Room phones, complete private systems save time and money in

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mills	railroad terminals
warehouses	stores
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factories	universities
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Kellogg "Intercommunicating" Sets are provided with standard Kellogg transmitters and parts, packed ready for quick time-saving installing.

Every one pays a sure revenue to the subscriber and to the telephone man.

Trunk connections allow easy exchange service controlled according to circumstances.

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Send today for our illustrated catalogue on Kellogg Intercommunicating telephones and give us an idea of size of the proposed installation. Our engineers are at your service for practical planning.

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CANADA WEST ELECTRIC, LTD.

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Five Thousand Seven Hundred Pounds And Still Held Solid

Harpoon Guy Anchor, with Wings Open, as when Anchor is set and holding

At this point the big elm tree, to which we had attached the chains and block, was cracking loudly and we had to stop.

But the Harpoon Guy Anchor, which we were demonstrating to convince a "man from Missouri," after pulling up to the full expansion of its wings, held as though nothing could move it further.

This test was made in hard clay, but the anchor was driven all the way down in four minutes.

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Five Reasons Why You Should Use Them

1st— They are the handsomest telephones made, and subscribers are pleased with them and take pride in keeping them neat. They put a stop to chronic kickers.

2nd— They are built to last almost indefinitely. The black enamel finish will outlast any known wood polish and will match any color of woodwork or inside finish.

3rd— They cost no more than reliable telephones of other makes, and are worth considerably more to you. They do not deteriorate and they save you the heavy maintenance expense you have been accustomed to with others.

4th— They are made by a manufacturer with a reputation for making the best telephone apparatus known. Their guarantee makes you safe.

5th— You will be using Steel Telephones altogether some day, so why not begin now. The sooner you get acquainted with the Ericsson kind the better pleased you will be later.

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No. 9

The above illustrates a most popular type of Magneto Switchboard. Has a capacity of 200 lines, two operators' positions, 30 cord circuits.

The cabinet is heavily paneled and beautifully finished; is provided with wide key shelf. Each operator's position arranged in 3 panels, 7 drops high, 15 wide. A class of equipment that has all late and new refinements to facilitate operation and produce rapid satisfying service. If you are interested, write us and our complete proposition will promptly follow.

Every telephone man has a standing invitation to call and inspect our plant — come and see for yourself the most complete manufacturing establishment in the Independent field.

Indiana Convention
Rooms 844-846

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P. B. X. Boards

A low price is not necessarily good selling argument, but high quality and a fair price is. The latter is what you want and what you'll get when dealing with us.

Indiana Convention Rooms 844-846

Illustrating No. 40 type private branch board. Has a capacity of 100-120 lines; 10 cords; 5 plug ended trunks. This board has swinging relay rack on the rear of cabinet, each and every part instantly accessible, cords, terminals and relays. We are prepared to supply this character of equipment on short notice and solicit your inquiries.

The Garford Mfg. Co., Elyria, Ohio

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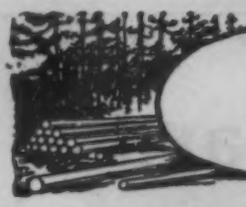

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Woods Run—**POLES**—Butt Treated
QUICK SHIPMENTS

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NORTHERN or WESTERN
Plain or Butt Treated
THE VALENTINE-CLARK COMPANY,
MINNEAPOLIS, MINN.
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CEDAR POLES
A FULL ASSORTMENT OF SIZES
PROMPT SHIPMENTS ASSURED
T. M. PARTRIDGE LUMBER COMPANY
Lumber Exchange MINNEAPOLIS

Duluth Log Company
POLE SERVICE
Duluth, Minnesota

"NAUGLE" POLES
Plain or Butt Treated. Largest Stocks.
READY FOR IMMEDIATE SHIPMENT
NAUGLE POLE & TIE CO.
Main Office: 59 E. Madison St. CHICAGO

WESTERN CEDAR POLES

AN EXCELLENT ASSORTMENT AT GOOD PRICES
DENNIS BURK & COMPANY CABINET, IDAHO.

POLES OF
STERLING QUALITY
Oldest Cedar Pole Firm in Business — Producers for 35 years
MICHIGAN AND WESTERN CEDAR
W. C. STERLING & SON COMPANY
1880 MONROE, MICHIGAN 1913

Reduces Construction Expense

Reeves Wood Preserver when used on telephone poles and construction work doubles or triples the life of the timber. This means that instead of putting up a new pole at the end of seven years, you put one up at the end of 14 years and the same with other timbers.

Reeves
Wood Preserver

is easy to apply—requires no heating or special apparatus. If quantity of work to be treated is large, a cheap vat may be constructed. We have prepared a special testing outfit by which you may see with your own eyes how the Preserver penetrates the wood, hardening there and keeping out moisture. If you are interested in reducing the cost of construction and making timbers last longer, we will be glad to send this outfit free.

The Reeves Co., Mfrs., New Orleans, La.

NORTHERN COAST TIMBER COMPANY
RED CEDAR POLES
TACOMA WASH.

POLES
Complete assortments. Direct Service.
Prompt shipments. Write us.
MELONEY BROS., Spooner, Minn.

POLES
Prompt Quotations and Best of Attention Given to All Orders
L. K. Deal Lumber Co.
DES MOINES - - IOWA

From **POLE** to **POLE**
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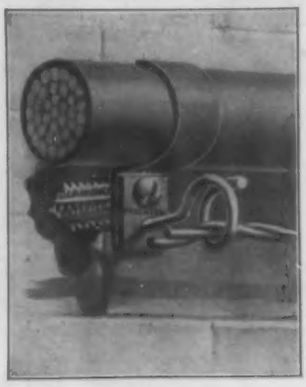

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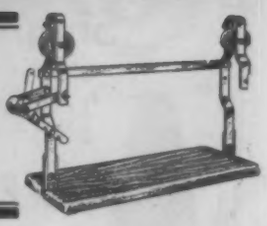

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THE MEANING OF "SERVICE FIRST."

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Slogans and Mottoes.

It was not so very many years ago that the importance of the selection of a life motto was urged upon every young man starting upon his lifework. A motto is defined as "a short, suggestive expression of a guiding principle." In the last few years the motto has been taken up by public utility companies in the way of slogans.

Those which are now favorites with telephone companies are "Safety First" and "Service First." The former is particularly pertinent to the construction, installation and maintenance forces, while the latter applies to all branches, particularly those having to do with operating. Some companies have adopted only one slogan, "Service First." They reason that this includes that of "Safety First," as the best service can only be rendered when conditions conducive of accidents are absent.

It would seem, however, that the "Safety First" movement should be given a distinct place in the construction, installation and maintenance departments. It has been found that practically 17 per cent. of all accidents are due to slipping, tripping and falling, and that 42 per cent. of them occur in the handling of tools and materials. An investigation of some 8,000 accidents showed them to be due to the following four big causes: Workmen falling from high places; tools, or material falling on the workmen; workmen dropping heavy parts; and the improper handling of tools. It is to be noted that guards could have prevented but few of these accidents, as they were due entirely to the personal actions of the workmen.

The remedy for reducing accidents to a minimum, therefore, lies largely with the employes. The workmen must become interested to make the "Safety First" movement a success. Educational methods must be used to show the probable results of careless working methods.

An incident occurred recently which demonstrates the value of safety first. A certain 87-foot pole at a river crossing had been in use for over six years and was not in good condition. As a safety precaution, the company foreman erected a pole by the side of the old one, binding them together. Shortly afterwards the old pole broke about 20 feet from the ground and but for the additional pole would have carried the cable into the river. The "Safety First" precaution therefore was also "Service First."

Many public utility companies, including telephone companies, have organized "Safety First" clubs to further the movement. Members are provided with buttons bearing the company emblem, having the words "Safety First" prominently displayed upon them. The foremen are provided with special gold buttons, as are also the officers of the club. The other members as they perform some notable service in the interests of the "Safety First" movement, are given the higher class buttons. There is thus a desire created to become the possessor of the more prized button.

The "Safety First" movement among employes has resulted in a very considerable decrease in accidents. It has caused men to think where formerly they acted automatically. They have learned that the "Safety First" movement is for them and by them and that personal caution is the greatest safeguard after all.

The "Safety First" movement has gained many adherents among telephone companies, both Independent and Bell. The Kansas Independent Telephone Association is one of the associations that has made a practice of boosting for "Service First." The "Service First" membership emblems which it has issued have undoubtedly done much to make this slogan popular in Kansas.

These two slogans "Safety First" and "Service First", are mottoes for every telephone company to consider. They are truly "short, suggestive expressions of guiding principles."

Backbones vs. Boneheads

By HERBERT KAUFMAN

The wise men of four nations pooh-poohed the pretensions of Columbus and proved to the complete satisfaction of the shrewdest medieval speculators that the financier who'd back a voyage for the discovery of a western continent would lose every ducat invested in the crazy scheme.

Until Watt made a practical demonstration of his engine, all powers of his eloquence couldn't extract one hundred pounds sterling of confidence from the strong boxes of his banking acquaintances.

Even after hundreds of thousands of shrewd Americans had witnessed the miracle of the "talking wire" at the Philadelphia Centennial, Bell experienced years of heartbreaking delay in securing sufficient capital to commercialize the telephone.

George Westinghouse wore out his soles and his soul peddling the air brake from capitalist to capitalist before he could discover one man sufficiently credulous to venture a handful of dollars on an invention that has since made millionaires by the wholesale.

Ten years after the flat-disc talking machine had proved its case, the shares of the Berliner gramaphone went begging for buyers at a fraction of par value.

So why are you whining? If genius itself must patiently endure sieges of discouragement, you surely can't expect to win without a wait. Ideals don't push men in the foreground—it's t'other way about; a plan is only as good as the men behind it. A level head is incomplete without a square jaw. Your fight has only started when you have reached out for something bigger and better. You'll never turn hope into success if you can't hold out against incredulity.

Human nature is a cantankerous and an uncertain thing. Humanity is constantly calling for originality. The universe is always urging ability to strive for innovation, stimulating imagination with laurel and checkbook. But society is "poor pay". It seldom settles its bills on presentation—you can't sell achievement C. O. D. History itself is still delinquent in a thousand instances. Great men unaccounted have died without their due. But for all that the game is still worth the candle—the percentage in favor of effort and enterprise more than counterbalances the uncertainty of recognition.

Squeezed into an epigram, the story of progress is that of backbone vs. boneheads. America is littered with splendidly begun careers wrecked on the reefs of ridicule and indifference.

If you are sensitive and vacillating and timid; if your will doesn't equal your skill —don't dare; play safe; find a common-place job and settle down to a wage-bound eventless life.

But if aspiration is leaping in your blood; if ambition is at your ear; if you are sure that you can be or do more tomorrow than today—throw back your shoulders; lift your head and challenge the community to down you.

Sustained by health, armed with irrevocable purpose and inspired by sanity, the man who won't give up can force the world to give in.

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Principles in Transmitter and Receiver Inventions

A Resumé of the Many Different Types of Transmitters and Receivers Which Have Been Patented and the Principles Involved in Their Operation—Present Instruments of the Carbon Electro-magnetic Types—Thermo-electric Types Now of Interest

By A. P. Connor

The telephone profession is practically familiar with only one type of transmitter and one type of receiver, the first being developed on the carbon resistance principle and the second on the electromagnetic principle. Of course, all are familiar with the fact that the standard type of receiver may be used as a transmitter but it has not been universally used as such. The thermophone is also apparently on its way to an important place as a receiver for telephone apparatus.

PRINCIPLES.

The principles that may be used for transmitters are as follows, and the list is believed to be complete as far as the art of the telephone is now developed:

1. Carbon resistance.
2. Electromagnetic.
3. Special materials.
4. Capillary attraction.
5. Reactance (induction and capacity).
6. Miscellaneous or transmitters depending on a combination of principles.

The principles applicable to the telephone receiver are as follows:

1. Electromagnetic.
2. Thermo-electric.
3. Electrochemical.
4. Special.
5. Compound receivers, as where a detector is used.

Transmitters embodying or using the carbon resistance principle are of the standard type and are so well known as to not require description in this article. This may be said to be the only principle used in commercial telephone practice.

A standard telephone receiver may be used as a transmitter but not with the results obtainable in the first-mentioned type of transmitter. Its action is, of course, opposite to that of a receiver, in that the sound waves of a person talking against a receiver produce fluctuations in the receiver diaphragm and cause such changes in the flux or magnetic lines and the coils of the magnet as to induce currents for transmission over the telephone circuit and thus enable others to get the message. In other words, the diaphragm instead of being used as means to produce sound waves, is used as a medium to receive sound waves and to transmit their action or energy to an electromagnetic circuit.

That other substances than carbon are capable of being used as a resistance medium for transmitters, that is, in place of carbon, is a feasible thought to all. Very few, however, are familiar with the knowledge as to what these substances are, but it may be suggested that the materials used in wireless detectors may be capable of supplying some of this information. As a matter of fact, a loose connection between almost any two conductors will permit and give the transmitter action, but in more or less feeble extent.

In Fig. 1 is shown a transmitter which makes use of oxygenated sulphide of copper, contacting with a zinc button. The sulphides or sulfides of copper or a combination or product resulting from the fusion of a sulfide of copper in the presence of oxygen, appear suitable for the purpose. The readers who are familiar with chemistry and particularly with the periodic laws may be able to select a great many more substances from the information this combination gives.

It seems peculiar that capillary attraction should be called upon to solve the telephone transmitter problem, but in Fig. 2 is shown an example of such, and its simplicity of construction makes it attractive.

The operation of the device consists in the diaphragm acting upon suitable capillary elements or parts made of glass, rubber, metals and other substances, which are immersed in a fluid or liquid which acts on them with a desirable capillary action. The movement of the fluid between the elements selected and used varies the resistance of the telephone circuit as it moves up and down between them. The liquid can or need not be of conducting material, depending upon what the other arrangements are.

It may be noted that the diaphragm can be of elastic or rubber. The movement of the liquid causes an action like a rheostat. The variation caused in the telephone circuit by this transmitter serves to transmit the message in the usual way. A particular feature about this transmitter is that its working parts can be hermetically closed in. It may be noted that the particular construction need not be followed, especially if the transmitter is to be used in a place where the transmitter might be turned about. The style illustrated shows the principle in its clearest form.

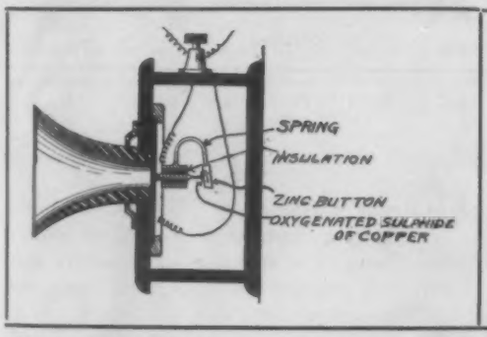


Fig. 1. Sulphide of Copper and Zinc Button Transmitter—

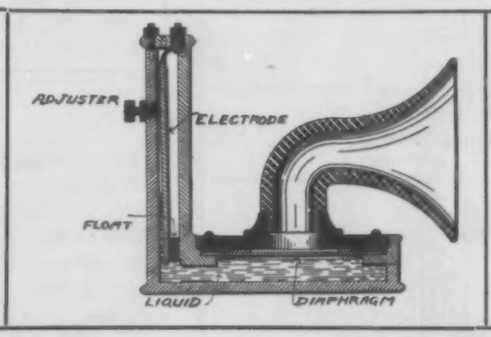


Fig. 2. Capillary Attraction Transmitter—

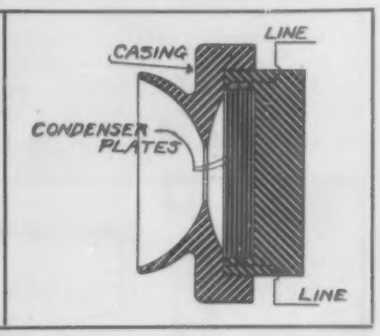
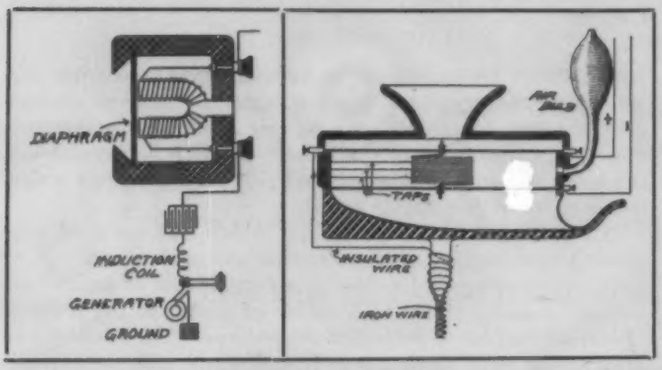


Fig. 3. Condenser Plate Type.

In Fig. 3 is shown a reactance transmitter. Its working parts consist simply of a series of diaphragm condenser plates, together with a casing to hold them. Talking at the first or outer condenser plate in the casing causes it to fluctuate in regular diaphragm manner. This varying the capacity of the circuit changes the current flow in the circuit. In such a case the telephone circuit must operate on an alternating current circuit. In Fig. 4 the transmitter is of an inductive type, and the variation of the induction in the alternating current sup-

plied to the telephone circuit, changes the voice current of the circuit. Here is a case where a telephone receiver might be put to good use.

The transmitter shown in Fig. 3 operates by a variation of the capacity of the telephone circuit which is energized by alternating current. The transmitter, Fig. 4, acts in a similar circuit by varying the induction or inductive resistance of



Transmitters: Fig. 4. Inductive Type—Fig. 5. Double Diaphragm.

the circuit. The variation of either causes a corresponding variation in the current of the circuit and thereby produces a telephone action on the apparatus at the other end of the line.

There are some systems of transmitters possible which are apparently not within the distinct bounds of a single principle as those previously mentioned. The transmitters shown in Figs. 5 and 6 seem to be suitable examples of instruments which come in this class.

The device illustrated in Fig. 5 has a mouthpiece in the front, while at the back is a passage from the outside so the voice sound waves can act on the lower part of the transmitter. This action causes the top and lower diaphragms of the transmitter to operate together and thus accentuate the result. Between the diaphragms in the telephone circuit is placed a thin wire coil which has several taps taken off of it. The coil is connected to, but insulated from, the diaphragms.

The transmitter casing is made of magnetizable material such as iron, or at least that portion of the casing which forms the back half or section. The line wire is wound around an iron wire, so as to magnetize it. This iron wire is in magnetic connection with the back of the transmitter as shown. The

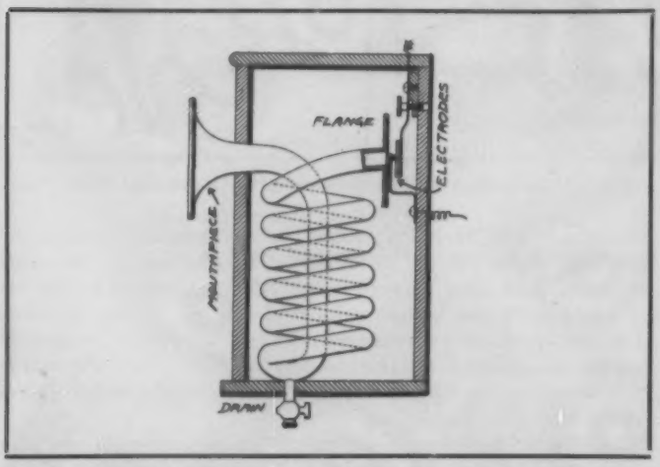


Fig. 6. Transmitter Without Diaphragm.

space between the diaphragms is air sealed and their tension is varied by means of an air bulb, which is squeezed.

In the operation of the device a person speaks into the transmitter. The sound waves pass through the mouthpiece and fluctuate the front diaphragm. At the same time, the sound waves also pass through the lower casing of the transmitter to the back diaphragm and actuate it thus to reinforce the action of the front diaphragm. The movement of the diaphragms compresses and extends the inner coil.

When the coil is compressed, it tends to short-circuit itself and therefore vary the current flowing. When it extends, it increases the resistance. This is because the lateral contact between the turns of the coils is broken and the resistance of the whole coil is thrown into the circuit, instead of permitting the current to jump from one turn to another without taking the longer course. It may be mentioned that the winding of the copper wire around the iron wire increases its length to an extent that the resistance of the copper and the iron wire will be the same. Thus the influence in the circuit on the other telephone apparatus is caused by the electric current in the usual way and also by the magnetism of the line.

In Fig. 6 is shown an invention by Sylvanus P. Thomson which seeks to eliminate the diaphragm entirely. The trumpet-like part is made of light or sound wave reflecting material, such as a mirror, highly polished metal, etc. There is an outlet provided at the bottom for the egress of collected moisture. The trumpet is made long in order to make sure that all the moisture will be collected before the voice waves reach the working parts. A flange is provided at the end of the trumpet

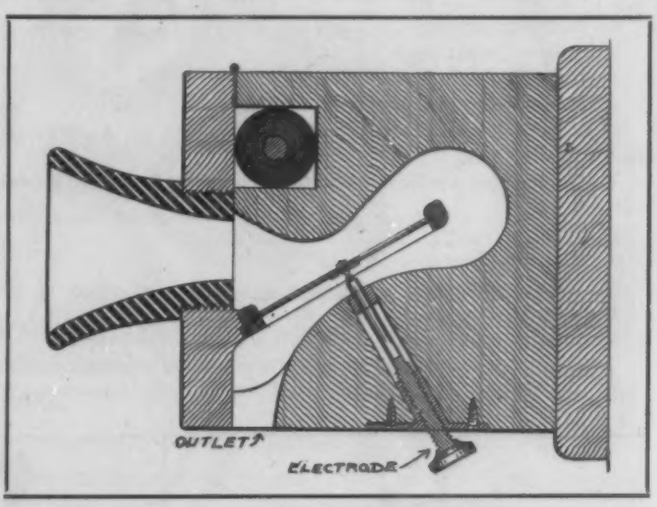


Fig. 7. Echo Type Transmitter.

to concentrate the sound waves on the working parts with the least dissipation of energy.

The working parts simply consist of an electrode or connection loosely pressing against a conducting surface, or another electrode with a flat surface. The sound waves cause the electrodes to vibrate and their contacts varying, cause the resistance and current in the circuit to vary.

The transmitter shown in Fig. 7 is designed to obtain a double sound wave action and to use as much of the speaking energy as possible. It will be noticed that there is no back-jumping action of the sound waves; that is, they flow right through the transmitter. This transmitter might be called an echo type telephone transmitter.

The writer does not want to discuss the practical phase of the various principles involved in the transmitters referred to in this article, but rather to bring out the principles so that the knowing of them may serve to enable telephone engineers and inventors to solve telephone problems where their specific use may be of great advantage. It will also be seen that the telephone art is not restricted in the limited manner in which the few forms now used commercially would seem to indicate.

The present standard type of commercial receiver operates on the electromagnetic principle, and does not require description in this article. Experience has proven that this type is worthy of the greatest praise.

In Fig. 8 is shown a departure from the standard type of receiver construction although the same general principle is util-

ized. A double electromagnet is employed and arranged on both sides of the diaphragm so that a doubly concentrated force will operate on it to cause it to operate more strongly.

This particular form is shown with coil magnets rather than

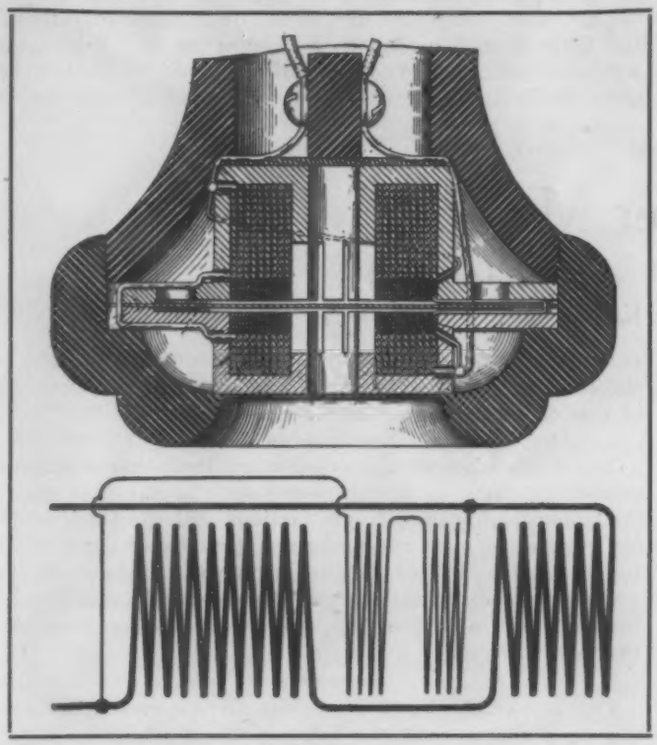


Fig. 8. Double Electromagnet Type of Receiver.

with permanent magnets, which of course could be used instead. The connections of the wiring is also shown. As the operation of the principle is similar to that of a standard receiver, its action will not need further description.

The thermo-electric principle is interesting, especially in view of the fact that this type of telephone receiver is fast making its way to the front and, although the present type has only

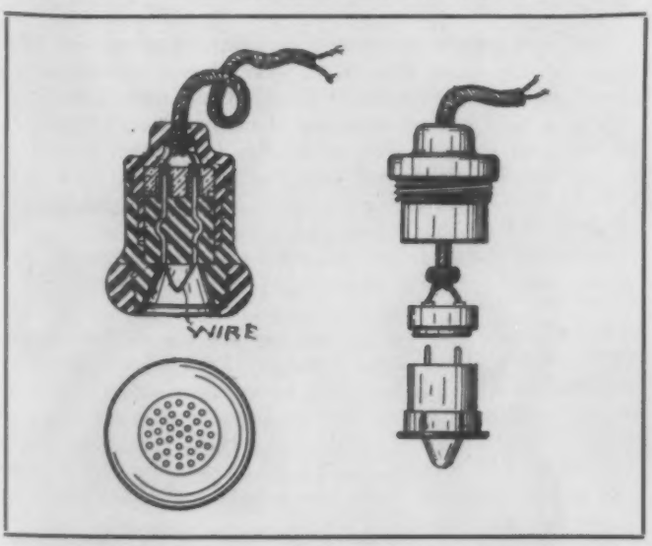


Fig. 9. Receiver of the Thermo-Electric Type.

been recently patented, it has proceeded rapidly to a commercial form.

The principle on which the device works consists of a voice current passing through a small Wollaston wire in the receiver and causing it to fluctuate from the heat developed and make sound waves which are capable of being distinctly received and appreciated by the hearing sense.

The thermophone, as it is called, is made smaller than a thimble and can be slipped *into* the ear. The particular form shown in Fig. 9 can be taken to pieces and the parts changed as may be necessary or desirable. This particular form is arranged for about every contingency that can arise in practice. Thus secretions of the ear cannot get to the working parts and cause trouble, and other troubles anticipated are eliminated.

That electrochemical transmitters appear possible and have been constructed is indicated in Edison's patent No. 231,704

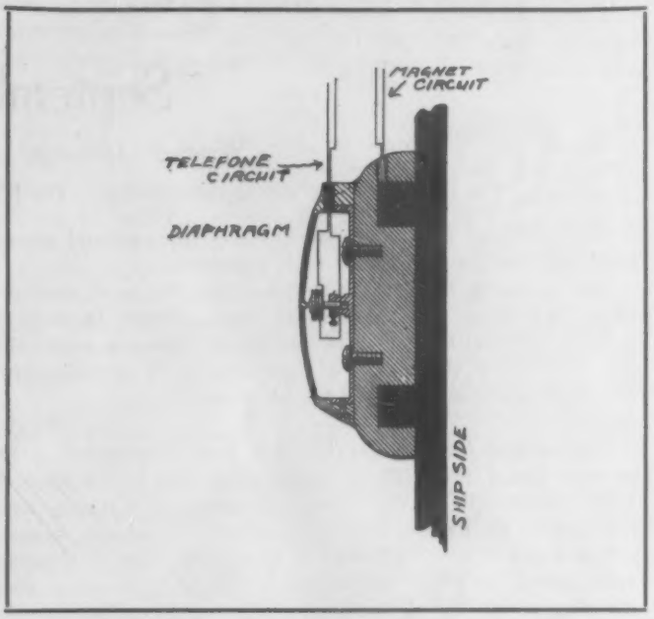


Fig. 10. A Submarine Transmitter-Receiver.

which describes such a transmitter inferentially, referring readers to another patent application which does not appear to be on record. The matter of looking up the data involves the investigation of records 35 years old. Edison states positively

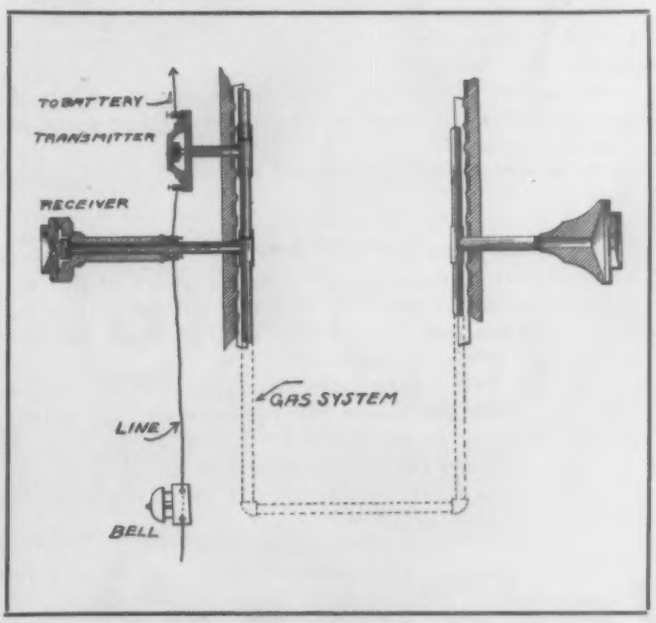


Fig. 11. Gas Used as a Sound Wave Medium.

that the receiver is of marvelous delicacy. It is shown in connection with a telegraph circuit and in the tertiary circuit of the same. The transmitter is intended to be of ordinary principles.

Special receivers are necessary for special conditions and those for receiving submarine signaling are in this class. One of these types is shown in Fig. 10, and this one is adapted for

complete submersion in water. It is provided with an electromagnet so that the receiver can be electrically secured to the side of a ship. The diaphragm consists of a part of the case, and operates on the principle of a transmitter. This makes this receiver a transmitter-receiver. All that is necessary to free it from its place on the ship is to cut off the magnet current. The attractive force being then broken, the receiver falls off and may be stored away for future use or inspection.

Under the heading of miscellaneous come telephonic arrangements which have no developed classification. The illustration of Fig. 11, is a good example. The transmitters and receivers in this case are essentially air-sealed. The medium of transmission consists of the gas in a gas system to which the receivers and transmitters are connected. The gas must be "piped" to the telephonic devices and in the case of magnets the latter should preferably be hollow so the diaphragms will be in full and close contact with the gases. In view of the great sensibility of gases to sound waves, this principle would appear to be practical.

September Morn

Weather—Industrial Relations—Some Decisions

By J. C. Kelsey

Fill your coal bins! Preparedness is the national word. Cold winters always follow cold summers.

The incoming flood of coal miners to the hard coal regions has been stopped by the war. There is such a thing as no coal to be had at any price. Already snowballing has taken the place of baseball in Wisconsin—and the birds have already started to mobilize.

The reason for the trouble has been discovered: In normal times, the high pressure area spends its winters in far northwest Canada. Then as summer time approaches, it migrates to Bermuda or some southern summer resort.

For some reason, whether it was from fear of German submarines, or plain forgetfulness, the high pressure area did not move, so all summer long we have been bombarded by cool northwest winds instead of the usual southerly zephyrs.

The weather is not the only thing out of joint. The whole human race seems to be crazy, especially that part of the human race which has been pleased to describe itself as the civilized world.

It seems that as long as men can be pioneers and seek solitude, comparative peace is possible. But there is no place in the world for the pioneer's axe and rifle. He is compelled to rub elbows with his neighbor. Then the quarrel begins for more room, and the weaker party has to move on or die.

Europe simply became crowded and was irritated accordingly.

This country has just lost an irritant. In the noise of war and contest, many people were not aware of this particular trouble. Today, the country visibly feels better. The United States Commission on Industrial Relations has just died from limitation.

Just why such a commission was appointed no one can explain, unless the mania for commissions can account for it. No one is mourning its demise unless it is the members and the supernumeraries who enjoyed the payroll privileges. This commission has gone, unknelled, uncoffined and alone.

Commissions are an American lunacy. There is a rule of cards which says, when in doubt play a trump. The country has modified this rule by saying, when in doubt, appoint a commission.

Commissions have been appointed to investigate farm life. It was pleasant work for a committee to roam leisurely about the country asking questions about things that every one knows.

Commissions have been appointed for nearly every purpose except that of an inquiry into the condition of our canary birds. It was a fine opportunity for some political service to be rewarded, but it is too late now, so great is the contempt for the report of any group of commissions of this order.

The United States Commission on Industrial Relations seemed to come as a crowning joke. In the first place, the commission was split into factions—the members could not even agree upon the fundamental merits of the Constitution of the United States. Almost all their efforts were of incendiary variety and the wonder is that Emma Goldman and others of her type were missing from the two-year pay roll.

The first crack out of the box is a recommendation that the government own the telegraph and telephone lines. The charge is made that the service is performed inefficiently and at a high cost in spite of low wages.

The whole report seems to be an appeal to the employe to take up arms against the employer, regardless of facts. It seems as if the entire energy of this commission was devoted to the agitation of a great strike in favor of six hours' service, and a great protest against health conditions that every well informed man knows is paramount in telephone engineering practice.

Just how the government can cut the cost and raise wages at the same time, is a form of legerdemain which this ill-starred commission did not attempt to explain.

It is a well known fact that a man cannot lift himself by his boot straps. Yet, while this feat seems denied to private parties, it seems that the government not only has this secret but can make the sun and moon stand still as well. This probably accounts for the feeling that the government could defeat the armies and navies of Europe with a couple of shot guns.

Next comes a gross charge against the Bell interests. The charge does not come in behalf of the helpless minority stockholder who has had such an unhappy existence. The charge is made that the Bell interests have never cared to deny; it is a charge of evasion of a law—not the law.

The old Bell company was a Massachusetts corporation, and it was operated under the hide-bound restrictions imposed by that state.

The management of the Bell company wanted to reorganize and capitalize the earnings which had gone into the property in excess of the dividends. Hence, they incorporated under the laws of New York, which, in order to keep New Jersey from controlling the state, completely liberalized its corporation laws.

The capital of the Bell company was increased from $26,000,000 to practically $76,000,000—something like three shares for one. See how this would apply to the average

Independent telephone company which for years has put its earnings back into the plant.

The stockholders did not get sufficient dividends, and the time came when the company had reached a satisfactory position with investors. What is wrong about issuing stock to your stockholders to repay them for the earnings of which they have been deprived?

Undoubtedly the Bell company in the early days had great profits and much money was put back into the property—once called a method of concealing earnings. But those were days of unrestrained competition or monopoly, and the courts had not defined the rule of limitation of earnings or recoupment of losses.

If your state law would not allow you to make restitution to your stockholders of that which rightfully belonged to them, would you think it unfair to go to another state to reincorporate?

The Bell stockholders had just as much property when their capitalization was $26,000,000 as when it was $76,000,000. The $50,000,000-stock melon surely did not belong to the public—it belonged to the stockholders. Nothing was changed except some certificates that merely represented the unchanged physical property.

Naturally the commission members rubbed their hands with glee when they came to a contemplation of the operators. It offered a fine chance to play to the great American grandstand, to show "the peepul" how their faithful commission was earning its money.

It is true that operators get nervous, but as a whole, they are a cheerful and happy lot. The suggestion of five hours a day is not at all in keeping with the facts. Every telephone exchange has a rest-room, at least, no new telephone building has been built for ten years without reference to the comfort of the girls.

It is true that telephone operators are hard to keep. The man who marries a telephone operator will never have reason to regret it, for he marries a clever and capable girl with resourcefulness to the last ditch. She sits in a perfect storm center of commercial activity, and is so unconcerned that no sound is heard in the operating room.

Compared to the school teacher, a telephone operator has every advantage. No physician has ever said of a telephone operator as he has often had occasion to say of a woman school teacher, that as a physical specimen, she is not worth the powder to blow her up. Compare four years of teaching and operating and see for yourself.

The Bell company does not control 70 per cent. of the telephone business. It is true that 85 per cent. of the telephone business is intercommunicating, but that is far from expressing control.

The Bell interests last year had 5,750,000 telephones. They connected with nearly 3,000,000 Independent telephones, and competed with 1,500,000 Independent stations. As a matter of fact, this indicates that the Bell interests control about 58 per cent. of the field.

It must not be forgotten that while the Bell company adds 400,000 telephones to its property, the Independent companies are buying between 350,000 and 400,000 telephones for their own use.

The idea that the Bell interests control the business has always been a nightmare to somebody. They have less chance to control the telephone business than the United States Steel Corporation has to control the iron and steel business. And everyone knows that the control of the steel business is not possible as long as men have to make a living.

The charge that the business of the Bell interests is enormously profitable is not true. It does not take much intelligence to figure that this company makes less than 6 per cent. on the active property value. It has not increased its capital without investment of capital.

What about the $40,000,000 practically invested and tied up in the Central Union Telephone Co. by receivership? What about money advanced to Bell companies that do not earn dividends? Look into every licensee company and you will find only one company where enormous profits may be said to be made. There are other companies that have normal earnings but they can only take care of themselves. On the whole, the charge of enormous profits is a false one.

The commission suggests the transfer of all employes to federal service, and here comes the jocular feature of the report. It recommends the absorption of the useless employes for other service! Do you know of any telephone company which carries men and women on the payroll who are not needed?

The ravings of John McCullough by phonograph are mild compared with the articulations of this deceased board. But in the midst of their insanity lies some cunning, for they suggested another commission for the purpose of establishing salaries. Possibly the Commission on Industrial Relations is trying to perpetuate itself.

Not one member of the commission missed a pay day—they were absolutely on time when it came to that. But they gave no thought to the telephone company on a method of having a pay day for its employes.

Wages are as high as the present rates admit; they must be paid in money, too. How can a telephone company increase the wages of employes and lower its rates? That is the question before the house of the telephone man.

Girl costs, or operating costs, average from one-fifth to one-fourth of the total expense of a telephone company. In the larger Independent companies, the girl costs average one-fourth of the total.

The average cost per telephone station ranges from $2.50 to $4.50. If the time is cut to five hours and the pay increased at the same time, the cost will be doubled. As far as private ownership is concerned, this means an increase in rate from $3 per year in smaller communities and $4.50 in the larger.

But rates are too high already, according to this commission. Anyway, it is a safe bet that the government will not tackle this problem of the boot straps. The work of the United States Commission on Industrial Relations belongs to the waste basket.

Not all commission forms are lunacy. I refer only to the fleeting variety. The permanent variety—known variously as the state, board, public utilities commission, and such—are possible to be with us always.

They are slowly grinding out the inequalities of the telephone business and between them and the courts, we may yet learn what our rights are.

The Oklahoma Telephone Association recently won two important victories before the Oklahoma Corporation Commission.

One, reported by E. C. Patton, attorney for the Oklahoma association and known as the Comanche case, establishes a principle that the originating exchange has the right to route its business as it sees fit. Heretofore, the Pioneer (Bell) company has routed messages as it saw fit.

Exchanges 1, 2, 3, and 4 are on a line. Exchanges 1 and 4 are Bell exchanges, while 2 and 3 are Independent. All are connected by local lines. Messages originating at exchange 2 for exchange 4 were sent via exchange 3 to exchange 4, but the Bell company at exchange 4 refused to accept them.

The Bell company insisted that exchange 2 should call exchange 1 and let the operator there call exchange 4, thereby depriving exchange 2 of mileage charges between exchanges 2 and 3. It preferred to haul a message 30 miles rather than share an 18-mile haul with a neighbor.

The other was the Alex case. The Alex company built a line to Chickasha. There was already a toll line belonging to another company which gave service from Alex to Chickasha.

The Bell company refused to connect with the new line on the theory that it had an exclusive contract with the original company. The commission, however, ordered the company to make the connection without delay and with the usual 25 per cent. in and out commission.

Thus we get nearer the fact that the telephone business is a common carrier. We will never be sure of it until the United States Supreme Court finally hears the compulsory physical connection arguments.

After all, it seems that war, bad weather, depressed business and commissions are factors in progress. Nothing gained without sacrifice seems to have any fundamental value to man.

MORAL: Action and reaction are equal.

Program for Indiana Independent Convention.

An interesting and instructive program has been prepared for the ninth annual convention of the Indiana Independent Telephone Association, to be held at the Claypool Hotel, Indianapolis, Ind., on September 15 and 16. The program is, in full, as follows:

WEDNESDAY MORNING SESSION.

Registration.
Meeting of executive committee.
Meeting of convention committee.
Roll call.
Address of welcome: Hon. Joseph E. Bell, mayor, Indianapolis.
Response: N. G. Hunter, former president of the association.

AFTERNOON SESSION.

Meeting of stockholders of the Indiana Toll Clearing Co.
President's annual report, Walter J. Uhl, Logansport.
Reading of minutes of last meeting.
Report of secretary-treasurer.
Appointment of committees.
Resolutions and amendments.
Credentials and membership.
Auditing.
Inspection of exhibits.

EVENING.

Banquet.

THURSDAY MORNING SESSION.

Address, "The Interstate Commerce Commission's Valuation of Telephone Companies," by F. B. MacKinnon, secretary, National Independent Telephone Association.

Address, "The Value of Association," by W. S. Vivian, secretary, Independent Telephone Association of America.

Address, "Efficiency," by Chas. J. Murphy, of the Indiana Public Service Commission.

Address, "Independent Telephony in the Early Days," by J. P. Goodrich, Winchester, Ind.

AFTERNOON SESSION.

"The Indiana Workmen's Compensation Law," by Judge Samuel R. Artman, of the Industrial Board of Indiana.

"Transmission," by H. D. Currier, chief engineer, Kellogg Switchboard & Supply Co., Chicago.

General discussion of Independent telephone interests in Indiana.

Unfinished business.
Appeals and references.
Report of committees.
New business.
Election of officers.
Adjournment.

Business of Ohio State Company Steadily Improving.

That business conditions are gradually and steadily improving is borne out by the net gain in subscribers' stations and the increase in long distance revenue shown by the Ohio State Telephone Co.

Rollo R. Stevens, general commercial superintendent of that company, states that the net gain in telephones in the 19 principal exchanges show marked improvement over the situation a year ago. Very substantial gains for several months have been made in Cleveland, Toledo, Youngstown, Canton, Massillon, Alliance, Dayton, Akron, Zanesville and Columbus.

A good barometer of the rise and fall of business is the situation with reference to the use of long distance. The first six months of 1915 show an increase in gross tolls of slightly more than 11½ per cent. over the same period of 1914. The prospects for increased traffic during the last four months of this year are better than they were September 1 of last year. Mr. Stevens admits that some of this traffic may be due to the widespread activity of his company in providing new facilities for local and long distance business, and a new commercial energy.

Balance Sheet of the Ohio State Telephone Co.

The condensed balance sheet of the Ohio State Telephone Co., Columbus, Ohio, as of June 30, 1915, shows total assets of $25,002,161. This includes $21,470,990 in plant, real estate and equipment, $1,027,558 cash, $173,536 accounts receivable, $342,665 for material and supplies, $429,805 in sinking funds, etc. The complete statement, which is being sent to the company's stockholders, is as follows:

ASSETS.

Investment:		
Plant, real estate and equipment		$21,470,990
Construction charges from July 23, 1914, to date		1,210,089
Securities owned		307,977
Current:		
Cash	$1,027,558	
Accounts receivable, etc.	173,536	
Material and supplies	342,665	
		1,543,759
Sinking funds		429,805
Deferred items		39,541
Total assets		$25,002,161

LIABILITIES.

Capital stock:		
Common	$5,205,875	
Preferred	4,972,225	
Bonds outstanding:		
Underlying	8,407,100	
Series B	5,000,000	
Total capital liabilities		$23,585,200
Current liabilities in process of payment		244,942
Deferred items not due—taxes, interest, etc.		156,750
Reserve for contingent liabilities	$117,056	
Reserve for accrued depreciation and amortization	307,379	
Reserve for insurance and casualty	11,867	
		436,302
Surplus		578,967
Total liabilities		$25,002,161

Design, Construction, Testing of Duplex Cable for Loading

Problems Encountered in Design and Construction of Quadded Cable for Loaded Circuits—Uniformity in Raw Material as Essential as in Manufacturing—Some Construction Requirements—Capacity Unbalance Test of Duplex Cable—Final Installment

By W. N. Furthmann

The most important test of duplex cable is the capacity unbalance test. This test is not only a manufacturing requirement, but is also considered a most important field test when splicing one section of duplex cable to another section. Therefore, in order to have a clear understanding not only of the method which is used in testing, but also of the important object and results, it will be necessary to have some knowledge of the design, construction and methods of operation of the set itself.

The connections of the capacity unbalance testing set are given in Fig. 2. In the lower part are shown the switches which are placed on the top of the set. Switches *A* and *B* enable the leads west to be connected to the leads east in any of the desired eight combinations. Switch *C* interchanges the white pair west and the black pair west with reference to the inner wiring of the set, an interchange which is necessary in order to test the unbalances between the phantom and either the white or the black wires. The interior connections of the set are arranged for testing either phantom to side unbalances or side to side unbalances.

The upper part of Fig. 2 is a developed view of the apparatus in the case. The two transformers and the resistance ratio arms are assembled on the side of the set containing the adjustable air condenser. In the drawing they are separated in order to show the connections clearly.

In a capacity unbalance set, it is as necessary to have the set free from capacity unbalance as it is to have a cross talk bridge without residual cross talk in the bridge itself. Mutual capacity due to the presence of shielding in the former is therefore as great a danger as it is in the latter. Suspending the conductors of the set in air without shielding will also be found advantageous in a capacity unbalance set. It will also be necessary to line the set with zinc and to furnish

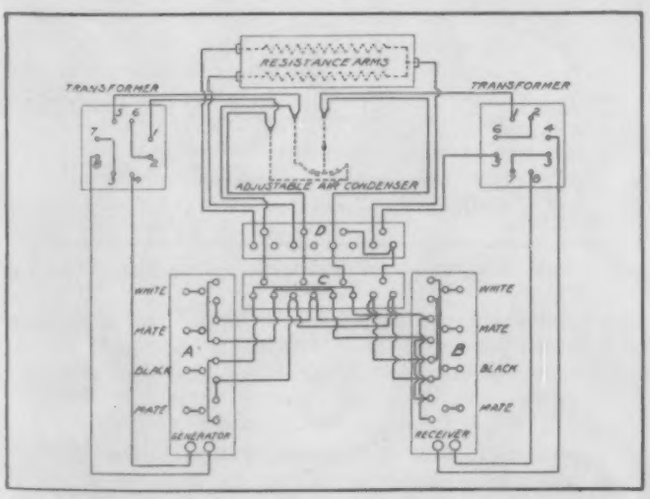


Fig. 2. Connections of the Capacity Unbalance Testing Set.

shielding around the ratio arms, transformers and the receiver.

An alternating source of current having a frequency of 890 cycles is also used in testing for capacity unbalance of duplex cable as well as for cross talk in loading coils. The alternator should be placed about 50 feet from the capacity unbalance set and the generator leads to the set should be shielded in being wired to the bridge.

The object of using capacity unbalance testing sets in the splicing of duplex cable is to facilitate the splicing together of adjacent sections in such a way that there shall be a minimum

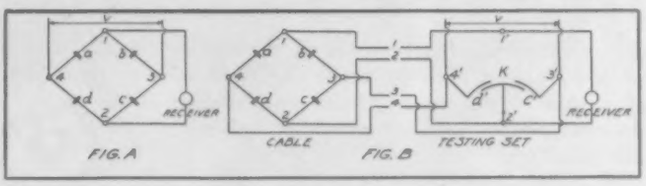


Fig. 3. Capacity Unbalance Test Between Side Circuits.

of cross talk between the two side circuits of a phantom and between the phantom and each of its sides.

Cross talk between pairs in a cable is largely due to inequalities in the capacities between the wires of one pair and those of an adjacent pair. Thus, if in Fig. 3-*A*, 1 and 2 are the two wires of one pair and 3 and 4 are the two wires of another, and *a*, *b*, *c* and *d* represent the capacities between wires 1 and 4, 1 and 3, 2 and 3 and 2 and 4 respectively, they may be considered to form the arms of a Wheatstone bridge. Since each of the wires has a capacity not only to each of the other three wires but also to the surrounding wires and sheath, or a direct capacity to ground as it may be called, the capacities *a*, *b*, *c* and *d* between each two wires include not only the direct capacities between these wires, but also an equivalent of their direct capacities to ground.

In a cable, where the direct capacities to ground of the different wires are nearly equal, this equivalent is sensibly equal to one-fourth of the direct capacity to ground of one wire. There are, of course, other capacities directly between the two wires of each pair; that is, between wires 1 and 2 and between wires 3 and 4, Fig. 3-*A*. As these capacities are connected across opposite corners of the Wheatstone bridge formed by the capacities *a*, *b*, *c* and *d*, they cannot cause cross talk. They are therefore omitted for the sake of simplicity.

If, then, an alternating voltage be impressed upon pair 3, 4 and a receiver be connected across pair 1, 2, the condition for no sound in the reciver—that is, for no cross talk—is $\frac{a}{b}=\frac{c}{d}$.

Where *a*, *b*, *c* and *d* are all nearly equal in magnitude, as in a cable, but do not quite fulfill this condition, the cross talk is proportional to $x=a-b+c-d$.

If a capacity equal to x is added to *d* or subtracted from *c*, the cross talk is reduced to zero. The initial unbalance, and hence the initial cross talk between these two pairs of the cable, may thus be measured by the capacity which it is necessary to add to *d* or to subtract from *c* in order to reduce the cross talk between these pairs to zero.

In order to accomplish this with a capacity unbalance testing set, the four wires of the two pairs are connected to the set in the way indicated in Fig. 3-*B*, No. 1 being connected to 1′, 2 to 2′, etc. *K* is an adjustable air condenser connected so that the capacity *d′* is between terminals 2′ and 4′ and the capacity *c′* is between terminals 2′ and 3′.

An alternating voltage *V* of telephonic frequency is applied between 3′ and 4′, and a receiver connected at 1′ and 2′.

When the scale of the adjustable air condenser, K, is at zero, capacity d' equals capacity c'. Turning the handle of the condenser, increases d' and decreases c' or vice versa. The scale is calibrated to read the difference between the capacity of d' and that of c' in micro-microfarads (mmf.), or millionths of a microfarad. If, then, with the two pairs of the cable

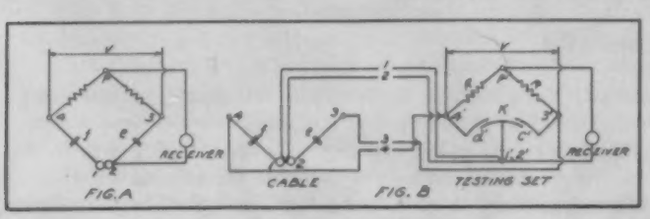


Fig. 4. Capacity Unbalance Test, Phantom and Side Circuits.

connected to the four corners of the testing set, the handle of K be turned until the cross talk is reduced to zero (that is, until $d'-c'=a-b+c-d$) the scale reading of the air condenser gives the capacity unbalance between the two pairs in the cable.

Cross Talk Between a Phantom and Its Side Circuits.

The cross talk between a phantom and one of its side circuits in a cable is largely due to the difference in the capacity between each wire of this side circuit and the two wires, taken together, of the other side circuit. As is indicated in Fig. 4-A, the two equal halves of the phantom repeating coil may be considered to be two equal arms of a Wheatstone bridge, of which the other two arms are capacities e and f between wire 3 and pair 1-2 and between wires 4 and pair 1-2 respectively. Since each of the wires has a direct capacity to ground as well as a direct capacity to the other wires, capacities e and f include not only the direct capacities between pair 1-2 and wires 3 and 4 respectively, but also an equivalent of the direct capacities to ground of the wires.

In a cable, where the direct capacities to ground of the different wires are nearly equal, this equivalent is sensibly equal to one-half of the direct capacity to ground of one wire; that is, capacity e is the direct capacity between wire 3 and pair 1-2 plus one-half the direct capacity to ground of wire 3, and capacity f is the direct capacity between wire 4 and pair 1-2 plus one-half the direct capacity to ground of wire 4. The capacity shunted directly between wires 3 and 4, which cannot cause cross talk, is disregarded for the sake of simplicity.

For no cross talk between pair 3-4 and the phantom, we must have $e = f$, and if e and f are nearly equal, the cross talk is proportional to e-f. In order to measure this quantity, the capacity unbalance testing set is arranged as is indicated in Fig. 4-B, wire 3 being connected to 3′, wire 4 to 4′, etc. The adjustable air condenser, K, is connected so that capacity d' is between 4′ and 1′, 2′ and capacity c' is between 3′ and 1′, 2′. An alternating voltage is applied between 4′ and 3′, and a receiver is connected between 1′, 2′ and the middle point P' of non-inductive resistance RR. When there is no cross talk in the receiver, the reading of the condenser scale, or d'-c', is equal to e-f; that is, to the capacity unbalance between the phantom and the side circuit 3, 4.

Insulation of Apparatus.

It should be noted that a leakage conductance between any two wires in different pairs, or from any one wire to ground, partially short-circuits one of the capacities which determine the magnitudes of the equivalent capacities a, b, c, and d, or e and f, and hence introduces an error in the measured value of the capacity unbalance. Such a leakage conductance also introduces a conductance component into one or more of the arms of the Wheatstone bridge formed by the equivalent capacities.

As the capacity unbalance testing set is not provided with any means of balancing such a conductance, its presence will make it impossible to reduce the current in the receiver to zero. It is therefore highly important that the capacity unbalance testing set and the leads connecting it to the cables, be well insulated from the ground, and that the wires of the cables be cleared at both ends from all grounds and crosses before any measurements are made on them.

It is evident that if two quads from adjacent sections of cable, one having a positive unbalance and the other having a negative unbalance of the same magnitude, are connected together the resultant unbalance will be zero. It is also easy to see that reversing the wires of either pair 1-2 or pair 3-4 when testing the unbalance between two side circuits (Fig. 3-B), or reversing the wires of pair 3-4 when testing the unbalance between that pair and the phantom (Fig. 4-A), changes the sign of the capacity unbalance. Therefore by properly connecting together the pairs in adjacent sections of cable, the capacity unbalances in those sections may be caused to partially or wholly neutralize each other.

As in practice it would frequently take an excessive amount of time to measure and record all the unbalances in a duplex cable, in order that adjacent sections might be connected together in the way giving the least possible capacity unbalance, the capacity unbalance testing sets are provided with a switching arrangement. This enables the four wires of a quad in one direction from the testing point to be connected to the four wires of a quad running in the opposite direction in any of the four possible ways. With each of these connections one can measure the unbalance between the two side circuits and the unbalances between the phantom and each side circuit by merely throwing a number of switches. In this way it may be quickly determined which method of connection of those two quads gives the least resulting unbalance and the two can be spliced together in that way.

The switching arrangements by which this is accomplished are indicated diagrammatically in Fig. 5. One quad is connected to switches A_1 and A_2, the quad in the other direction being connected to switch B. Reversing either switch A_1 or A_2, reverses the pair connected to it. Reversing the switch B interchanges the two pairs. Switch C is inserted in the leads connecting the two quads with the set in order to facilitate

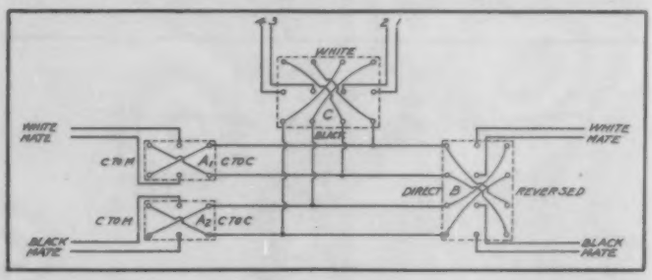


Fig. 5. Switching Connections of Capacity Unbalance Test Set.

interchanging the two pairs of these leads. This interchange as has been previously stated, is necessary in testing the unbalance between the phantom and its two side circuits.

(*Conclusion.*)

Automobile Aids in Restoring Telephone Service.

An interesting story is told in the daily press of the part played by a Ford car in putting the telephone system in Galveston, Texas, back into operation after the terrific hurricane had struck the southern city and put all power plants and means of communication out of business.

The engine of the Ford was started and attached to a generator. The electrical power thus supplied was sufficient to rejuvenate the entire telephone system and the plant was soon in operation. The work of rescue and relief was thus greatly aided.

Evolution of Operating to the Dignity of a Vocation

Hardships of Former Operators Made Way Easy for Present Operators — Efficiency, First Quality Demanded in Public Service — Some Errors of Omission and Commission — Paper Presented at Convention of Illinois Independent Telephone Association

By Miss T. Anne Barnes

Until quite recently telephone operators would not have dared assume the dignity of considering that they had a vocation, or that they were *business women*. They were recognized simply as "hello girls." There are a few old timers yet, who are not willing to believe that their "hello girl" is a real little woman, with just as much feeling as ordinary beings. Their thought of her is that she is just a careless, foolish, young thing, with a mouth full of gum, and that her chief occupation is entertaining some "fellow," or reading a novel.

Heroism of the Telephone Operator.

Because of the impersonality of the operator, her good deeds have never been known, but I believe that they would fill the very biggest book in the world. Her forgetfulness of self, and willingness to serve in the most extreme need, have been much written about for the last two or three years. The following are a few examples of her heroism: At the breaking of the dam at Austin, when the waters swept down the valley, destroying all the homes and business places, seeing the flood of water bearing down upon the town, her first thought was not for safety, but to first warn as many people as she could. During the great flood at Dayton, Columbus, and other cities in Ohio, the telephone girl stayed at her post day and night, warning people to flee. When the danger was over, she still remained at her post, giving report of the progress of the water, and information as to where help was needed.

Then comes the story from far-away Belgium, of the telephone girl at Dahlen. In the midst of the battle she was not concerned about her safety, but showed her cool-headedness by telephoning the officers at the forts that they were not properly placing their shells. Guided by these instructions over the telephone, they changed the direction of the fire and regulated it effectively. She remained at her post directing the Belgium fire, until a German shell destroyed the office and killed her. The story of the Russian girl was published the other day. She stayed at her post when everybody else had fled, doing her work with shell falling all around her. In all these cases she was but a humble figure, not incited by higher pecuniary reward, or the hope of fame.

Down the long stretch of years since the beginning of her vocation, she has given to the world long, weary hours of service, uncomplainingly. Her reward has been rebuff for her failures; silence for her good deeds. Her training for her vocation was simple as to its methods, but particularly hard as to application, for it had depended upon her ability to "wade in" and learn, by her mistakes, the right way, instead of being taken step by step through a systematic training, as is becoming a custom in companies of reliability today. The spirit in which she worked is given in the following clipping, and is a letter from one telephone girl to another, speaking of other days:

"When you were with us the operating force consisted of one chief operator and your operators; and we all worked from ten to fifteen hours a day, same on Sunday (without extra pay). Do you remember how everybody worked just for the love of work, without any salary, and how happy we were when we received three months' pay?" You will notice in the foregoing this telephone girl never once refers to their hardships and I am sure they were many.

I heard a fine sermon the other Sunday. It appealed to me because it was practical. One of the best thoughts was, that if we suffer, it is because someone after our time is to have things that were impossible dreams to us; and if we live in that period when those dreams have become realities, it is because someone has suffered before our day.

While the minister was speaking of the missionaries, I was thinking of the telephone operator of former days, who sat harnessed in her chair, long and wearisome hours, in poorly ventilated and heated rooms, with nothing about her that was cheery, or homelike, as we have today; and while I felt sorry for the missionary, I felt more sorry for my telephone girl. But now I know through her hardships, the way has been made easy for *you* and for *me*, and for the reason that it has been made easy, pleasant and profitable for us, we must increase our zeal and effort to become more efficient operators.

It is the operator of today of whom I now speak. I am sure she has the same splendid qualities as her sister operators of former days. But as times change, she must change also, as everything else does. The same facilities for handling the present day service that were used years ago could not be used at all now; neither could we use the same books of instruction and rules for handling service and operators. Today personal efficiency is the first quality demanded, in any kind of service, and especially in the case of a public service.

Self Interest Limits the Operator's Possibilities.

As we do not want these telephone managers who are listening to this paper to get the impression that we think we are perfect, I am going to point out some of our errors of omission and commission. We frequently hear an operator say: "I don't intend to work myself to death for this old company." What a mistake an operator makes who works in this spirit. Did you ever notice how a stream of water running from a faucet may have the force scattered by putting a little arrangement over the opening of the faucet to make the water spray? We scatter our forces when we put *self interest* in the foreground. We limit our possibilities.

There are so many kinds of workers in our vocation; one type is the operator who allows herself to grow so mechanical in her work that she uses little bodily energy, less mind, and no personality. Her type is usually found in the medium sized or large office, where operators are guided by switchboard markings and certain rules for operating. This kind of an operator feels no interest in her work, as far as she personally is concerned. She would detach herself completely from any responsibility, if it were possible. To her, the work is the same yesterday, today and tomorrow. She is losing more each day she works than the coming years can ever give back to her, no matter how much effort she makes then; besides, she will never know the real enjoyment of life as she waits to find it outside her working hours.

As children we used to throw pebbles into the water and

watch the ripples form and grow wider and wider, until lost in the distance. And we wondered why such a tiny thing as a pebble could make so much disturbance, or if the ripple ever stopped, until it broke on the opposite shore. I wonder how far the ripples go that have their start from an act of impatience, carelessness, or forgetfulness? I wonder if they, too, do not break until they reach the shore of eternity. If this is true, we cannot afford to work or play without the best use of the powers of the body, mind and spirit.

We frequently hear operators exclaim: "What a lot of disturbance over such a little thing!" A ticket with a wrong telephone number passed on to the record clerks, reaches the wrong patron. This ticket record is also placed on various office records. When the mistake is discovered by the patron to whom the bill is sent, an unpleasant interview is possible. The mistake is traced back to your number. How much time, inconvenience and unpleasantness might have been spared if only you had guided your fingers with your thoughts?

Did you ever stand behind two operators and watch them accomplish the same amount of work, although one was quick as lightning and the other one seemed almost slow in comparison?

I read an interesting article recently on the same object, which bears out my statement that the speediest operator is not the best as a rule. It read: "At the cotton mills I watched a young, nervous, Italian girl at a spinning frame. She ran up and down the frame, flew from spindle to spindle and filled the air with useless motions. She was not content to watch her own frame, but seeing something wrong with that of another girl, darted at that. She gave the impression of terrific speeding. On the opposite side, a girl of calmer temperament worked leisurely at the same number of spindles. These two girls were earning the same wages."

Here is a thought for the impatient operator in case there are any here to day; memorize it for the good of the cause.

I saw a good poster in a store recently, which read: "If you are right you can afford to keep your temper; if you are wrong you cannot afford to lose it."

We have a poster on the board in front of the trouble clerk. It reads: "Use the voice with the smile; it wins." My, but this poster helps sometimes. I *know*—because I sit at that desk a few hours every day. If we could just remember this smile recipe and live up to it, how different the world would look to us; and how differently we would look to this world. This recipe is warranted to efface wrinkles and indigestion:

When the weather suits you not,
Try smiling.
When your coffee is not hot
Try smiling.
When your neighbors don't do right
Or your relatives all fight,
Sure it's hard, but then you might
Try smiling.
But it cannot make them worse—
Just smiling.
And it seems to help your case
Brightens up a gloomy place
Then it sort of rests your face—
Just smiling.

An operator in speaking of her vocation, said she was so tired of the work and wished she were fitted for work of an entirely different nature. She said it seemed so hard to feel that your service was not appreciated—and it surely was not appreciated as people generally spoke in such cold, hard tones. They also were so quick to censure you for any little failure in service.

Girls, you see this operator judged the patron's lack of sympathy because of his impersonality, just as he could not feel her interest over the telephone. Remember, every lamp signal represents a home or place of business. Few of them are free from care, vexations, troubles or sadness. As the patron looks towards you for help in case of fire, sickness, or emergency, as well as the ordinary affairs of life, let him look to you as something dependable, cheerful, and always *ready* to *serve*. Then it will not matter to you, how impersonal you may seem to him as a being. It is not the material that counts, but the spirit embodied within. And our greatest happiness consists in what we contribute to others—not in gifts—but service.

If we could go up in an airship and travel for an indefinite period, for the purpose of studying the earth from a different viewpoint, we could scarcely find a little corner of it that is not intersected by poles, wire and rail. Because of these facilities for travel and talk, we must meet the demand of the times with greater personal efficiency. Our method of training must be a systematic and co-operative standard study of service in Illinois, if we are to meet our requirements.

Daily Study of Long Distance Operating Rules.

People, as a rule, do not like to take up an idea until someone else has studied it thoroughly, used it long enough to be satisfied, and is willing to recommend it. I am willing to recommend the system of handling long-distance service, taught by W. S. Vivian in his schools of instructions. We have been using it for two years in our office at Bloomington, Ill. The instruction may be found in the red book, which is used daily in our long distance and local rooms. When I say *used* you may not realize how we have time to study a book daily, so I will tell you just how we do. Every morning the long distance chief operator takes each operator through the form of a ticket in the following manner:

The chief operator acting as patron, places a call with the operator. She records the ticket in the proper way, and thanks the patron (chief operator) with the phrase: "Thank you, I will call you in a few moments." The recording operator then, acting as line operator, tests her circuit with the phrase: "This is Bloomington. Are you waiting? Are you through?" She passes her ticket to an imaginary distant operator in the usual form. Sometimes she sends her ticket "collect," "messenger," "appointment," etc., so as to keep familiar with the different forms of ticket. I suppose someone is thinking that her regular work would be all the practice she needed. We take operators through these daily drills for the purpose of impressing them with the one correct and authorized way of handling their work.

The chief operator, or supervisor in the local room also drills each operator daily on the local phrases, in the following way: She places the operator at a vacant position, and using her desk telephone, has the operator repeat phrases after her. The purpose is to emphasize the fact that only these phrases are permissible, and to train the operator to speak directly into the telephone in a clear distinct tone, and yet keep the voice inaudible in the operating room.

We keep three or four local operators in training as to form of "recording," "receiving" and "passing" tickets. Being familiar with the ticket, makes it easier for them when they are sent out for practical training at the board.

There is one great obstacle that we are all familiar with in long distance work. It is not easy to co-operate when operators of other companies either do not understand our phrases and codes, or will not recognize them, as they have their own, if they use any. If they do not have any, it is still harder. This is the cause of friction. And "friction is

the rock upon which efficiency splits." If every telephone company in Illinois would adopt one system of handling long distance service, the results would be wonderful. I hope this will be one of the next progressive steps of the Independent companies in Illinois.

Field Telephone Important Factor in European Strife.

Since the telephone has become such an important factor in the European war it is only meet that war telephony should have been made the subject for a special lecture in London a short time ago. Charles R. Darling, lecturer in physics, had for the title, "Field Telephones," and his audience was very interested in what he had to say concerning these remarkable instruments. The lecturer said the war has very rightly been called a "telephone war" and that before war broke out no one ever dreamed telephony would be called upon to play the part it has in international strife.

It was pointed out that in the fighting zone, flags signaling, being too conspicuous, has been abolished and all communications from the trenches to the base and between the different battery units are now carried out with the aid of telephones. Mr. Darling said the telephones wires were always being cut by shells, spies or other agencies and a number of attempts are now being made to devise a system of multiple lines so as to keep up communication longer.

According to the lecturer the enormous armies that are being gathered together in the field are making necessary an increase in the number of skilled telephone men who can undertake field service. He suggests that science teachers combine and offer their services for the training of field telephone men, whose work could not be picked up by drill alone. At present a very large percentage of the post office employes have gone to the front as telephone men but many more are, and will be, wanted.

The speaker dealt with the duties of the field telephone man, and with the components and operation of field telephones as now used in the British army. The Japanese were the first to make extensive use of the telephone in large scale warfare, and, during the past year of trench warfare, the telephone has proved an indispensable and generally the only practicable means of communication in the fighting zone.

As source of current two small dry cells are invariably employed. These rapidly become exhausted, and the range of voltage for satisfactory communication is only from 1.5 to 1.3 volts per cell. A high-pitched buzzer is used for calling purposes and also for telegraphic communication by Morse code. Speech transmission is rarely practicable near the firing line. To save weight and space the induction coil and buzzer may be combined in a single apparatus, and the latest service buzzer, the D-Mark 3rd, with bipolar, double-wound magnets and a double-ended reed oscillating about its center, gives a remarkably pure and even note.

Watchcase type receivers and carbon granule microphones are invariably employed. With a head receiver strapped in position, a sleeping operator is awakened with certainty by the calling buzzer. Earth return is always employed, and since the receiver cord forms part of the line circuit, there is special advantage in using two receivers in parallel, apart from the possibility of two persons then listening at once to important messages. The standard D-Mark 3rd field set, complete with leather case, weighs just over eight pounds.

For temporary communication, the Japanese practice of using single iron wire lines varnished for insulation, is generally followed. Such wire is not worth picking up again. More permanent installations demand the use of stranded steel wire with weatherproof insulation. Copper is never used chiefly on account of the ease with which it is broken. To prevent frequent interruption of service by spies, cutting wires or by shell splinters breaking the lines, an irregularly-constructed "ladder" line is often used, this consisting of two main lines interconnected by as many "rungs" as possible.

Many branches in the network thus formed may be broken before through communication is interrupted, but it is not always easy to make the numerous joints required when laying the line, and earth faults at breaks may place the line out of service in wet localities before through connection is broken. An alternative is to provide multiple conductors brought into one or more intermediate "dug-outs," but not interconnected by rungs. Operators in the intermediate dug-outs test the lines at frequent intervals and make cross-connections as required to replace a broken section of one line by the corresponding section of one of the other lines available. A broken line being thus disconnected gives no trouble by earth faults.

In conclusion, Mr. Darling pointed out that drill, discipline and bravery were not sufficient to make a useful field telephone operator. Knowledge of the construction and methods of working and repairing his instruments is also essential. The speaker suggested that teachers from polytechnics and secondary schools, now on vacation, offer their services to train field operators.

Annual Report of California Telephone & Light Co.

The California Telephone & Light Co., which operates in the Sonoma Valley, Cal., has reported for the year ending June 30, 1915, an increase in surplus, after preferred dividends, of 82.3 per cent. The statement follows:

			Increase	Per
Gross revenue:	1915	1914	Amount	Cent.
Telephone	$49,755.51	$46,987.16	$2,768.35	5.8
Electric	72,967.59	64,094.13	8,873.46	12.8
Miscellaneous	531.89	717.58	*185.69	*25.8
Total	123,254.99	111,798.87	11,456.12	10.2
Expenses, including taxes	67.209.50	64,202.50	3,007.00	4.6
Net revenue	56,045.49	47,596.37	8,449.12	17.7
Interest accrued	23,830.04	21,536.54	2,293.50	10.6
Balance	32,215.45	26,059.83	6,155.62	23.6
Amortization debt discount and depreciation	4,240.81	3,180.11	1,060.70	33.3
Balance	27,974.64	22,879.72	5,094.92	22.2
Preferred stock dividends accrued	20,126.88	18,575.38	1,551.50	8.3
Balance	$ 7,847.76	$ 4,304.34	$3,543.42	82.3

*Decrease.

New Members of A. I. E. E.

The August issue of the Proceedings of the American Institute of Electrical Engineers reports the transfer of Harold E. Nichols, engineer of the research branch of the Western Electric Co., New York, to the grade of member and the election of Gustav Hirsch, consulting engineer, Columbus, Ohio, to membership in the Institute. The following are also reported to have been elected associate members: Fred H. Clark, division plant superintendent, Mountain States Telephone & Telegraph Co., Salt Lake City, Utah; Thomas F. Irvine, plant inspector, Central District Telephone Co., Wheeling, W. Va., and Percy G. Sargent, district plant chief, American Telephone & Telegraph Co., St. Louis, Mo.

Another Ford Story.

The Central Union Telephone Co., at Newcastle, Ind., has purchased and is housing together, a Ford and a Harley-Davidson motorcycle. Recently the motorcycle was found badly damaged when the garage was thrown open in the morning. The Ford is being accused of a jealous attack.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

172. How does the graphical method show the variation in the voltage of the current produced in the armature winding of an alternating current generator?

173. Why is the horizontal axis laid out in degrees of rotation in the curve of alternating current voltage?

174. What is the maximum voltage reached by an alternating voltage of sine wave form when its meter value, according to commercial voltmeters, is 220 volts? 440 volts?

CHAPTER IX. The Common Battery Substation Circuit.

175. *Reason for introduction of common battery systems.* The common battery circuit, as its name implies, is an arrangement in which the battery for the operation of the telephone instruments is located at the central office and is *common* to all the lines in the office. As telephone exchanges increased in size and importance, it was found that the expense of maintaining a large number of individual batteries at the telephones became a large item of expense. This expense was not the only objection to the local battery in large exchange districts.

The batteries, owing to the different degrees of usage to which the various telephones were subjected, always differed widely as to their condition. The fresh and strong batteries naturally insured the best transmission. The most frequently used telephones, however, imposed the heaviest tasks on their batteries. The result was that where the most efficient battery was needed, at the busy telephone, it was impossible to provide it for very long. On the other hand the comparatively light traffic from some telephones meant that their batteries, where excellent condition was not so essential, were usually in the best of condition.

176. *Disadvantages of local batteries.* Early attempts were made to install a storage battery at each telephone and to charge over the line circuit. In one system, these small local storage batteries were charged while the instrument was idle. In another system, they were charged while the instrument was in use. Both of these plans eliminated the necessity of renewing zincs, and sal ammoniac, but it was found that the expense of looking after a great number of small storage batteries was very little, if any, less than the expense of maintaining a large number of primary batteries.

It is true that the modern dry cell offers a means of caring for local telephone batteries at much lower expense than the old type of sal ammoniac battery, which every old telephone man will remember. When the LeClanché and Law batteries were used in telephones, each troubleman had to carry a kit containing sal ammoniac in bulk, zincs, porous cups, and Law battery carbons, in addition to tools and repair supplies.

177. *Importance of understanding basic common battery principles.* About 1898 the first commercially successful attempts were made to feed the battery supply for the telephone transmitter over the same wires from the central office as those carrying the telephonic voice currents.

The principles underlying this step, to be considered in addition to those already studied, should be thoroughly mastered, as the common battery system is now the standard for all exchanges handling traffic above a well defined value per station. It is quite important for the telephone man of today to master the basic principles of the common battery or central energy system of telephone operation. This is essential even though he may have been in active contact with its maintenance for years. Not only does it offer a means for operating at the lowest cost per station in offices for which it is suitable, but it also renders possible the use of much simpler and more easily maintained telephone instruments than is possible with the local battery system.

178. *Curves of direct and alternating voltages.* Consider for a moment the upper curve shown in Fig. 72. This represents a constant direct voltage of ten volts applied over the line circuit to the terminals of the common battery telephone instrument. The curve covers a *time* of two seconds and represents the voltage of the direct current furnished to the telephone transmitter over the telephone line wires in a common battery system. Now suppose an alternating voltage represented by the lower curve in Fig. 72 is to be sent over the line also.

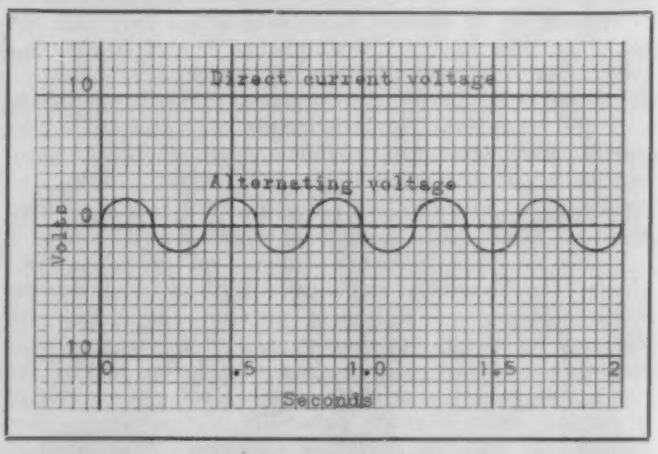


Fig. 72. Graphic Representation of Direct and Alternating Voltage.

An alternating curve, such as the one shown, is much more regular in shape than the curve representing the voltage of the telephonic voice current, but the principle to be brought out governing its transmission over the circuit, is exactly the same as the principle governing the transmission of the tele-

phonic voice currents over the common battery circuit. A curve, such as the lower one shown in Fig. 72, would properly represent the voltage of the alternating current, transmitting a pure musical tone if the frequency were much higher. That is to say, its frequency is constant and its voltage varies uniformly between the same fixed limits.

179. *Combined curve of direct and alternating voltages.* Now let us suppose that the alternating current whose voltage

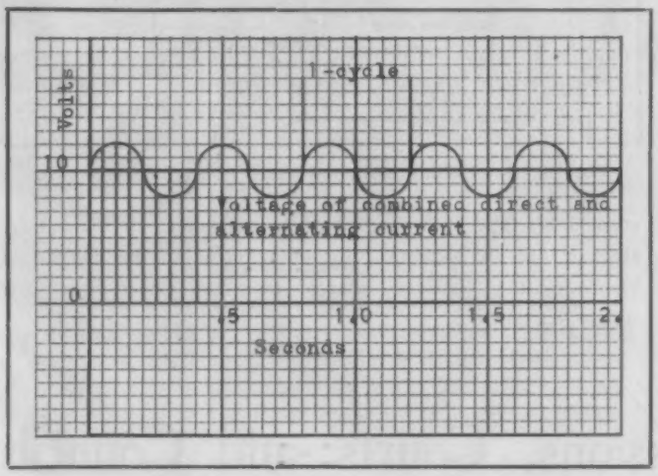


Fig. 73. Alternating Current Voltage Superimposed on Direct.

curve is represented in the lower curve of Fig. 72, is sent over a line circuit already carrying the direct current whose voltage is represented by the straight line curve. What is the result? When the alternating voltage is in the same direction as the direct current voltage, it increases it. When it is in the opposite direction, it reduces the voltage of the direct current. Since both curves represent a time of two seconds, we may combine them in this way. That is to say, when the voltage of both is in the same direction we may add them together. When the voltage of the two currents is opposed we may substract one from the other.

Suppose we should make this addition or substraction as the case might be, for each tenth of a second throughout the time covered by both curves, using the graphic method. We should obtain a curve like the one shown in Fig. 73. The reader should note that the voltage represented in this curve fluctuates between 8 volts and 13 volts and not between two volts positive and two volts negative like the alternating voltage curve in Fig. 72. It is clear that the regularity or irregularity of the alternating curve would have no effect on the character of the result obtained by this method. It will, of course, have an effect on the shape of the resultant or combined curve. That is to say, if the alternating voltage is irregular in frequency and range, the resultant combined voltage will also be irregular in frequency and range. It will still be true, however, that when the two voltages are in accord, they will be added in the combination. When they are in opposition the effect will be to reduce either the direct current voltage or the alternating voltage, whichever has the greater value at the instant.

In Fig. 73 is shown the resultant voltage obtained on the line by combining the two curves shown in Fig. 72. This is done by taking the vertical value of the voltage of each curve at each period of .05 seconds, laying them out in the proper relations to the same scale and then drawing the curve to connect the points obtained. When this has been done, the curve of Fig. 73 is obtained. The vertical values of the alternating voltage in combination are shown by the short dotted lines. When the line extends upward, the voltage is to be added. When it extends downward, the voltage is to be deducted. In general, when a line extends downward below the horizontal axis, in the graphic method, the quantity represented is negative. When a line extends to the left of the vertical axis, the quantity it represents is also negative.

180. *Voltage curve of alternating telephonic voice current.* In Fig. 73 the operation of combining the two curves of Fig. 72 is carried through one complete cycle of the alternating voltage wave, or .4 seconds by means of the solid vertical voltage lines every .05 seconds. It is clear that each succeeding cycle will give precisely the same result and that the voltage on the common battery line, under the conditions supposed to exist, will be like the curve of Fig. 73.

The curve shown in Fig. 74 is drawn to represent roughly the voltage of an alternating telephonic voice current. When this voltage curve is combined with a direct voltage curve, as before, the result is obtained in the same way and is shown combined in the illustration. While this is the same in principle as the result shown in Fig. 73, it is more nearly in accord with the actual shape of the telephonic voice current as it occurs on the common battery circuit. In order to secure space from left to right, only one-fifteenth second of time is shown. This, due to the high frequency of the telephonic voice curve, includes several complete cycles. The frequency of the alternating current in Figs. 72 and 73 is very low. It is much lower than telephonic frequencies or any other commercial frequency.

181. *Separation of direct and alternating currents.* It is now clear how the alternating voice current voltage and the direct current battery feed voltage are combined by going over the same wire, but is obvious that it will be necessary to separate them again into the component parts in order to secure telephonic transmission.

The alternating current transmits the telephonic sounds. The

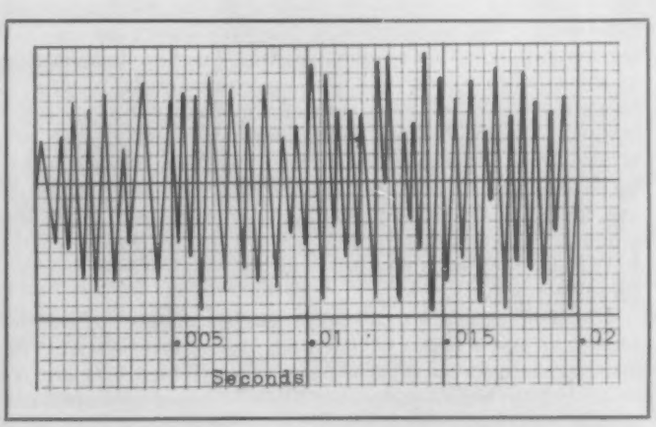


Fig. 74. Voltage Curve Similar to That of Voice Current.

direct current feeds the transmitter. Suppose, therefore, that an impedance coil is connected across the circuit. We have seen that the self induction of the impedance coil will tend to prevent alternating voice currents from passing through its winding. The impedance coil, however, offers no obstacle to the passage of the direct current except its ohmic resistance.

This, it will be remembered, may be made very low, the *ampere turns* of an impedance coil being the all important consideration.

Let us place the transmitter, which requires the direct current, in series with the impedance coil. Now a condenser will offer very little resistance to the alternating current, but will offer a barrier that is practically impassible to the direct current. Therefore, if we place the receiver in series with the condenser, we shall filter out the voice carrying current for the operation of the receiver.

182. *The common battery substation circuit.* The arrangement shown in Fig. 75, is the wiring in theory of the common battery telephone instrument manufactured until recently by one of the large telephone instrument makers. The direct current for the transmitter *must* flow through it and this impedance coil, and nowhere else. The alternating current carrying the telephonic waves *must* flow through the condenser and receiver and nowhere else. Now by the addition of the hook switch contact shown at *A*, the common battery instrument, without the ringer, is completed.

There are many forms of the common battery instrument circuit, all of which are good, but the one shown was selected because it offered the means of clearly showing the theory under which they all operate. The reader would do well to take

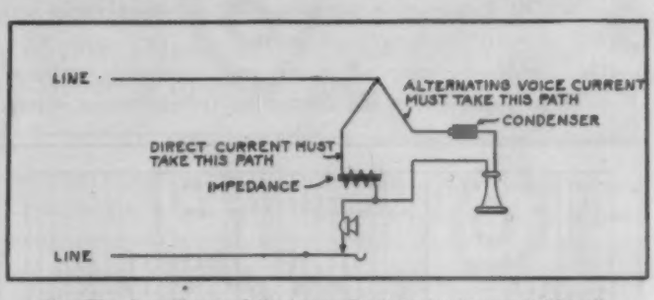


Fig. 75. One Form of Common Battery Instrument Circuit.

some other type of common battery instrument circuit and analyze it for the elements touched upon as to the method of separating the telephonic current from the direct transmitter supply current.

(*To be Continued.*)

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision of Telephone Companies, Decisions of Courts in Matters Affecting Public Relations of Utilities and Actions of City Councils Bearing Upon Franchises, Rates and Service

California Ruling on Advance Deposits.

After an investigation covering a period of ten months, the California Railroad Commission recently rendered its decision revising the system of advance deposits required by gas, water, electric and telephone utilities, and holding that it was the duty of these utilities to make reasonable extensions for the service of their patrons. This order, which becomes effective October 11, abolishes to a large degree the present system of deposits and entails the refunding of substantial sums now held by the various utilities throughout the state as deposits from patrons.

The commission received 634 separate complaints on the subject of these deposits and the refusal of the utilities to make extensions. The investigation entailed an inquiry into each of the complaints and an examination into the rules and practices of about 1,000 corporations. The decision takes the form of 18 separate rules, which cover most of the 634 cases under consideration. Under the new ruling, customers taking flat rate service from water, gas, electric or telephone utilities henceforth need pay no deposits if they own the property served or can secure a responsible guarantor or have paid their bills promptly during the preceding year. The $5 deposit charge is reduced to a maximum of $2.50 for residence or domestic consumers.

Telephone companies can no longer discontinue service for failure to pay a back bill, but may protect themselves by demanding deposits as payment in advance if back bills are not paid. Service henceforth cannot be discontinued until after reasonable notice of intention to do so. Deposits will bear interest at 6 per cent. and must be returned after 12 months. Except in cases of extensions, the signing of contracts as a condition precedent to service is abolished.

The so-called service connection charges of water, electric, gas and telephone utilities are abolished. Prima facia, it is made the duty of utilities operating under general franchises in cities to build extensions at their own cost, but in unusual cases they may apply to the railroad commission for a ruling. The question of who shall bear the cost of extensions in unincorporated territory shall be settled between the parties or, if they cannot agree, by the railroad commission. Within 90 days utilities shall return the deposits hitherto made to all persons who have paid their bills promptly during the last year. Application may be made to the commission for relief if hardship results from the application of any rule to a particular case.

Practice of Requiring Deposits Forbidden in Washington.

In a sweeping order issued August 21, the Washington Public Service Commission forbids the telephone companies doing business in the state to collect deposits from subscribers, and requires the refunding of all deposits now held. In place of the deposit, however, the order permits telephone companies to collect rentals for telephones ten days after becoming due, in default of which the service may be discontinued. Two months' rental may be collected in advance, according to the order.

Of the 159 telephone companies operating in the state, it was shown at the hearings held by the commission that 12 required a deposit as a condition precedent to service. The commission found that not all persons were required to make this deposit. There were no fixed rules by which the responsible patrons were separated from those of doubtful responsibility. Clerks in the offices of telephone companies, it was shown, have been permitted to exercise their discretion in separating responsible patrons from those deemed of doubtful responsibility.

Rule 1, established by the commission, directs that no cash deposit or other security, for the installation of an instrument and for the payment of accounts for local exchange service or long distance service between points in the state of Washington shall be required by any telephone company.

Rule 2, forbidding the usual $5 deposit, gives the telephone company the right to exact from any subscriber two months' rental in advance at the time of ordering service. Such charge in no case shall exceed $5. If the service

charge ordered shall exceed the sum of $5 a month, the patron shall pay from month to month in advance. If the service charge shall not exceed the sum of $5, the portion not absorbed in the first month's rental shall be applied upon the succeeding month's rental, and the patron shall thereafter pay from month to month in advance.

The commission allows the company to discontinue telephone service on or after the expiration of ten days from the date on which any account for local exchange service or long distance service becomes due.

One objection raised to the deposit charge is that the average person who makes a deposit to cover a default will allow it to be absorbed by the service. The company, having the deposit as security for the default of the patron, will naturally absorb the deposit rather than enforce payment, the commission says. Statistics offered by the telephone companies do not prove that all moneys deposited and absorbed mark the amount the company would lose if no deposit were made.

Physical Connection Ordered at Chickasha, Okla.

In an order issued by the Oklahoma Corporation Commission on August 19, the Pioneer Telephone & Telegraph Co. is required to make physical connection at its Chickasha exchange with the toll line of the Rush Springs Telephone Co. extending from Alex to Chickasha.

This ruling is the outcome of a complaint filed, on June 1, by the Rush Spring Telephone Co., of Alex, Okla. In the complaint, the company states that it has recently constructed a toll line from Alex to Chickasha and that it has made repeated requests of the defendant for physical connection of its toll line with the switchboard of the defendant at Chickasha, the complainant agreeing to pay 25 per cent. commission on business originating or terminating, routed over such line.

In its answer to the complaint, the defendant states that on August 8, 1905, it entered into a certain contract with the Purcell & Lexington Telephone Co., now known as the Purcell Telephone Co., under the terms of which the Pioneer company made physical connection with the lines of the Purcell company, including toll lines of the Purcell company from the Chickasha exchange of the defendant extending in a southeasterly direction through the towns of Alex, Bradley, Lindsay, Mayesville and Pauls Valley. Under this contract a mutual agreement was made between the defendant and the Purcell company for the interchange of toll business. The defendant states that to give physical connection to the lines of the complainant would be in violation of the letter and spirit of the contract with the Purcell company and would be to the injury, detriment and disadvantage of the Purcell company and of the defendant and without benefit to the public.

The defendant states further that the Rush Springs company has built competing lines to its lines between the towns of Rush Springs, Ninnekah and Chickasha and that to give physical connection to the lines of the complainant at Chickasha would enable the complainant to take the business of the defendant between the town of Rush Springs and the city of Chickasha.

The issues raised by the defendant that might arise in the matter of competitive business, or rather business that might be competitive after making the physical connection prayed for, the commission held, complicate the case and not necessarily being a part thereof, will not be considered in this case. Any controversy that may arise over traffic between Rush Springs and Chickasha should be settled in a future proceeding.

The commission, having considered the evidence and being fully advised, is of the opinion that under section 5, article 9 of the constitution of Oklahoma, the defendant company should connect its exchange at Chickasha with the long distance line of the complainant running from Alex to Chickasha, and that it should handle the long distance business of the complainant originating at Alex without delay or discrimination, for such compensation as might appear just and reasonable. On this point the commission finds that the defendant shall be allowed a commission of 25 per cent. upon the business outgoing and incoming at Chickasha over the lines of the complainant.

The section of the Oklahoma constitution referred to provides that:

"All telephone and telegraph lines, operated for hire, shall, respectively, receive and transmit each other's messages without delay or discrimination, and make physical connection with each other's lines, under such rules and regulations as shall be prescribed by law, or by any commission created by this constitution, or any act of the legislature, for that purpose."

According to the commission's order, the complainant is directed to make immediate arrangements to defray the expense of making the connection and the defendant is required to make the connection without delay.

Rate Increase Authorized for Miami, Okla.

The Oklahoma Corporation Commission recently issued an order granting the Pioneer Telephone & Telegraph Co. permission to charge $2.50 per month for business telephones and $1.50 per month for residence telephones in the city of Miami after the company has finished the installation of a common battery telephone system in that city and completed other arrangements designed to improve the service.

A complaint was filed with the commission some time ago by a number of the patrons of the company, asking that the Pioneer be required to install a common battery system in that city. Since the filing of the complaint it was reported to the commission that the company had completed plans for installing that sort of a system. The patrons of the company in a petition filed with the commission agreed to the advance in the price, provided they were given the common battery service. The present rates, however, remain effective until the company completes the installation of the new system.

Re-hearing Ordered on Proposed California Merger.

On complaint of R. L. Swanson to the proposed merger of the Tehama County and Glenn County telephone companies with the local system of the Pacific Telephone & Telegraph Co., recently approved by the California commission, United States Attorney General Gregory has ordered a re-hearing of the entire proceedings:

The complainant, Mr. Swanson, is owner of 155 miles of telephone lines giving service throughout Antelope Valley and the Paynes Creek and Manton sections in the eastern part of Tehama county and depends on the Tehama company for Red Bluff switching. Mr. Swanson has been operating in competition with the Pacific Telephone & Telegraph Co. and its two lines are practically parallel through the section in which Mr. Swanson is operating.

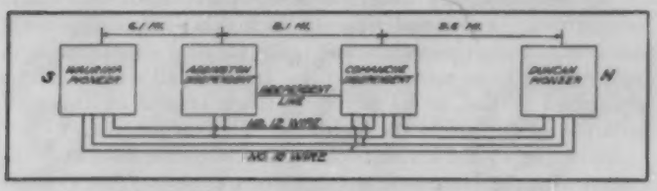
Mr. Swanson contends that if the proposed merger is allowed to go through he will be at the mercy of the Pacific company and he fears that the Pacific company, even though it continue to give him service with Red Bluff, would be in a position to throw all the toll business over its own lines.

Oklahoma Ruling on Routing of Long Distance Messages.

A precedent, relative to the routing of long distance messages, has been established by the Oklahoma Corporation Commission in an order issued August 19 in the complaint of the Comanche Telephone & Telegraph Co. vs. the Pioneer Telephone Co., the main principle established being that the originating exchange shall have the right to route a message as it may choose.

The complaint was filed on May 18, 1915, by the Comanche Telephone Co., which owns and operates a toll line connecting the exchange at Comanche with the exchange at Addington. The

defendant, the Pioneer Telephone & Telegraph Co. owns and operates a toll line between Duncan and Waurika, passing through Comanche and Addington; also a toll line between Duncan and Comanche. The complaint alleged that the defendant had refused to accept messages routed (or offered for routing) from



Location of Exchanges and Circuits Between Them.

Addington to Duncan over the line of complainant to Comanche, and in lieu of such routing it required the calls originating at Addington and terminating at Duncan to be made over its own line, thence north passing the place of origin to Duncan, although the routing first described is more direct. The complainant prayed that the defendant be required to permit the routing of messages north from Addington, through Comanche to Duncan, and points beyond, and to make connections and to put through calls so routed impartially and with dispatch.

Having heard and considered testimony in the case the commission found that Waurika, Addington, Comanche and Duncan are in line, each one with the others, Duncan being 9.6 miles north of Comanche, while Comanche is 8.1 miles north of Addington, while Addington is 6.1 miles north of Waurika, making a total distance of 23.8 miles from Duncan on the north to Waurika on the south. The commission also found that it was possible to talk to Duncan in two ways: 1. Over the Comanche short line to Comanche and through the Comanche exchange to Duncan over the Pioneer's short line between Comanche and Duncan; 2. Over the Pioneer's short line from Addington to Waurika, through the Waurika exchange to Duncan, over the Pioneer's long distance line.

It developed at the hearings that when a party in Addington calls via Comanche for a party in Duncan (where the exchange is owned by the Pioneer) the Duncan operator will not complete the connection but insists that the party calling shall make his call via Waurika to Duncan.

The various contentions made are summarized by the following suggestions:

1. That the party calling shall be accorded the right to designate the circuit to be used.

2. That the exchange originating the call should have the right to designate the line (or initial line, in case of different connections to complete a circuit) to be used.

3. That the exchange terminating the call or "putting up" the party called, should have the right to designate the circuit to be used.

The commission is of the opinion that to permit the party calling to designate the circuit to be used, might prove inconvenient to the public at large (as many might have to wait during the arbitrary tie-up of the line by one) and therefore detrimental; that since the telephone company is by law under the supervision of the commission, in order to render acceptable service to the public generally and to meet the expectations and requirements of the commission, the exchange originating the call should be accorded the privilege of designating the route to be used, when more than one route is accessible, or of designating the line first to be used, when one or more initial lines are accessible in making a circuit including other lines necessary to complete connections in such circuit.

This, of course, precludes the suggestion that the exchange terminating the message should have the right to designate the route to be used. The originating exchange is the one to which the calling party looks for the securance of the necessary connections and for the handling of his business with dispatch, and it would seem rather arbitrary to ignore the originating exchange while vesting in the terminating exchange the right of routing a message which the originating exchange is supposed "to put through."

For the reasons already stated the commission issued an order requiring the Pioneer Telephone & Telegraph Co., so long as proper traffic arrangements exist, to complete connections at Duncan for calls to that place or points beyond, when originating at Addington and routed over the Comanche toll line through Comanche to Duncan and other points.

Plan for Workmen's Compensation Bill in Kentucky.

Telephone companies in Kentucky are much interested in plans which are being made for the presentation of a workmen's compensation bill at the next session of the state legislature, which convenes in January. A law was enacted in 1914, but was declared unconstitutional by the court of appeals because it was regarded as being in effect compulsory.

A workmen's compensation commission, representing the Kentucky Manufacturers' and Shippers' Association, the Kentucky Mine Owners' Association, the State Federation of Labor and the office of the attorney general has been drafting a measure, and the insurance interests are now endeavoring to secure representation on this commission in order to have a hand in drafting the proposed law.

To Investigate New York Municipal Telephone Service.

A special committee to investigate the telephone service to the municipality has been appointed by the mayor and controller of New York City. The committee is composed of Putnam A. Bates, electrical engineer of the fire department and chief engineer of the bureau of fire alarm telegraph, chairman; Michael R. Brennan, superintendent of telegraph of the police department; Robert B. McIntyre, supervising statistician and investigator, and Chester M. Gould, assistant engineer of the department of finance.

It is intended to analyze the nature and different classes of service rendered by the telephone company, and to investigate such technical points as routing of leased wires, duct space allowed in subways, mechanical devices applied, and also practical questions bearing on the departmental use of the city's telephones.

Regulations for Transmission Lines in Nebraska.

An exhaustive set of regulations governing the crossing of electric wires over railroads and thoroughfares has been adopted by the Nebraska State Railway Commission, in accordance with an act of the last legislature placing such regulations in its hands. The rules will apply only to new or replaced construction, or where the overhead crossings are complained of or where they do not have a clearance of 25 feet above the roadway.

Poles supporting wires must not be more than 125 feet apart and must be of certain length, height and size, according to the number of wires they support. The regulations extend even to the cross arms, pins, and insulators. One set of rules applies to telegraph and telephone wires, and another to electric transmission lines.

Sterling, Neb., Telephone Case to Supreme Court.

The Lincoln Telephone & Telegraph Co. has appealed to the state supreme court from the decision of the state railway commission in the Sterling telephone case. The railway commission held that it had no authority to forbid the establishment of the People's Telephone Co., in Sterling, where the Lincoln company has already established an exchange.

Telephone Consolidation Ordered at Moody, Texas.

The city council of Moody, Texas, has passed a resolution whereby the two telephone companies now in operation in that

town are ordered to consolidate, the Texas Telephone Co. taking over the plant of the Southwestern Telegraph & Telephone Co. Moody is a town of about 2,500 population, in McLennan county, 30 miles south of Waco.

Order for Connection at Columbia City, Ind., Appealed.

Application has been filed in the circuit court at Columbia City, Ind., asking for an injunction to prevent the order of the Indiana Public Utilities Commission requiring physical connection of the two systems at Columbia City from being carried out.

The petition was filed by the Farmers Mutual Telephone Co. and seeks to invalidate the order recently issued by the commission, ordering it to connect with the Whitley County Telephone Co. The case is set for hearing on September 7. The company claims that the connection would be at great expense, and would require much additional expense in maintenance, all without adding anything to the revenue of the company.

Transfer of New Jersey Telephone Stock.

The Delaware & Atlantic Telegraph & Telephone Co. was recently authorized by the New Jersey Public Utility Commission to transfer on its books $4,738,500 of the capital stock of the Bell Telephone Co. of Pennsylvania to the New York Telephone Co. The Bell system in the northern part of the state has been operated from New York and the system in the southern part from Philadelphia. As a result of the transfer of stock approved by the commission the entire Bell system in New Jersey will be operated from New York.

Summary of State Commission Hearings and Rulings.

ARIZONA.

September 15: Hearing in regard to complaints against the rates and charges of the Mountain States Telephone & Telegraph Co., in Tucson, Ariz.

September 22: Hearing in regard to complaints against the rates and charges of the Mountain States Telephone & Telegraph Co., in Flagstaff, Ariz.

CALIFORNIA.

August 12: Order revising the system of advance deposits required by gas, water, electric and telephone utilities of the state and holding that it was the duty of these utilities to make reasonable extensions for the service of their patrons. This order is the result of an extended investigation and inquiry into 634 separate complaints on the subject of advance deposits and refusal of utilities to make extensions. This ruling abolishes to a large degree the present system of deposits and entails the refunding of substantial sums now held by the various utilities throughout the state as deposits from patrons.

ILLINOIS.

August 25: Petition of Wayne County Telephone Co. and the Business Men's Commercial Club, of Fairfield, Ill., for a certificate of convenience and necessity to operate a telephone system in Fairfield on the ground that the Commercial Telephone & Telegraph Co., of Olney, is operating an inferior plant there is denied temporarily, but final decision is reserved. The Mutual company is not ordered to cease operating, however, and the final action will depend upon the improvement of the Commercial company's plant.

August 25: Cordova Telephone Co., of Cordova, permitted to increase rates for telephones from $5 to $9 per year.

August 31: Hearing on application of Jackson County Telephone Co., of Murphysboro, to change telephone rates and end discrimination.

August 31: Hearing on application of Daniels Telephone Co., of Iuka, for a certificate of convenience and necessity to construct and operate a telephone toll line between Louisville and Xenia to connect its line at each point.

August 31: Hearing on petition of V. L. Huey, et al., of Dix township, vs. the Gibson City Home Telephone Co., and the Dix Telephone Co., for connection with the Gibson Home Telephone Co., instead of the Dix company for service in Dix township.

September 1: Hearing on application of Layton Telephone Co., for authority to change telephone rates as between stockholders and renters at Rushville.

September 1: Hearing on complaint of Sam Morris, manager of the Lake Matanza Summer Resort, Havana, vs. the Citizen's Telephone Co., of Havana, as to defendant company having no toll connection with the Bell company at Havana.

September 28: Postponed hearing on the petition of the DeKalb County Telephone Co., of Sycamore, Ill., for an increase in rates. This action was taken for the purpose of giving the telephone experts of the commission an opportunity to review the inventory submitted by the company's officials.

INDIANA.

August: Mutual Telephone Co., of Shipshewana, Ind., granted authority to increase its yearly charge for service from $6 to $10.

MARYLAND.

September 8: Hearing on the investigation into the rates, rules and practices of the Chesapeake & Potomac Telephone Co. in the state of Maryland.

MICHIGAN.

September 1: Hearing in regard to objection to the proposed increase in rates in Detroit by the Michigan State Telephone Co.

MINNESOTA.

August: The Northwestern Telephone Exchange Co. has surrendered its franchise at Owatonna, Minn., and applied for an indeterminate permit under which to operate its system.

August 19: An indeterminate permit to operate its exchange at Thief River Falls, Minn., has been granted to the Tri-State Telephone & Telegraph Co.

August 25: The commission granted the petition of the Greenwood Prairie Telephone Co. for permission to reduce its toll rates between Plainview, Elgin and Millville, Minn., from 15 cents for a three-minute period to 10 cents.

NEBRASKA.

August: Valpariso Telephone Co., Valparaiso, Neb., authorized to increase its rates to $2.50 for single line business telephones and to $1.50 for single line residence service.

NEW YORK.

September 3: Hearing at Keeseville, N. Y., on complaint of patrons of the Keeseville Telephone Co. in the vicinity of Jay, Essex county, asking for improved service.

OHIO.

September 8: Hearing in regard to the complaint of Wm. A. Shafer asking that the Cincinnati & Suburban Bell Telephone Co. be compelled to connect with the Hamilton (Ohio) Home Telephone Co. for the purpose of giving toll service to Cincinnati.

OKLAHOMA.

August 19: Order requiring the Pioneer Telephone & Telegraph Co. to make physical connection at its Chickasha exchange, with the toll line of the Rush Springs Telephone Co., extending from Alex to Chickasha.

August 19: Order issued on the complaint of the Comanche Telephone Co. vs. the Pioneer Telephone & Telegraph Co., requiring the Pioneer company to complete connections at Duncan for calls to that place or points beyond, when originating at Addington and routed over the Comanche toll line through Comanche to Duncan and other points.

August 21: The Pioneer Telephone & Telegraph Co. has been authorized to increase its rates to $2.50 per month for business service and $1.50 for residence service in the city of Miami, after it has completed the installation of a common battery system in that city.

OREGON.

November 1: Hearing on application of the Coos & Curry Telephone Co. and the Coquille Valley Telephone Co. for permission to increase their rates at Coquille, Ore.

WASHINGTON.

September 1: Hearing relative to proposed consolidation of the two telephone exchanges in the towns of Hanford and White Bluffs, Wash.

WISCONSIN.

August 28: Order directing the Strawberry Telephone Co., of Rewey, to improve service. Complaint was made that service on eleven lines running into the Rewey exchange was not adequate. Investigation by the commission showed that many of these lines were independent and ran into Rewey only for exchange connection. Sixty days' time is given to comply with the order.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, Written by J. C. Kelsey and S. R. Edwards

Quiz Questions on the Preceding Installment.

59. What forms have to be complied with in Minnesota in connection with taking out incorporation papers?

60. Why are managerial powers of a corporation delegated to directors?

61. Into what divisions or units is the management of a corporation divided? What are the general duties of the corporate management?

62. What is the theory of corporations?

63. State the rights of stockholders as a body.

64. What may be said to comprise the individual rights of stockholders? When does the stockholder obtain his share of a corporation's earnings? Why is it essential to give written notice of the first stockholders' meeting?

65. Has a stockholder the right to inspect the books of a corporation? What is an argument against it?

66. Why is it important that stock certificates should bear the words "fully paid and non-assessable."

CHAPTER VI. The Corporate Organization (Cont'd).

67. *Election of the Board of Directors.*—The board of directors is chosen by the stockholders at their annual meeting. Usually the holders of common stock have the only voting power, although in some cases the preferred stock has voting power. Sometimes preferred stock gets a vote only when its dividend has been passed. This usually is the penalty of failing to pay the preferred interest when due.

Illinois has a system of cumulative voting. The purpose of the plan is to get a representative of the minority stockholders on the board. There is nothing so pathetic in its helplessness and purposelessness as a minority stockholder, except the act of drawing directors' fees. Through cumulative voting, if a person has 100 shares, and the election of ten directors is to take place, he can vote 1,000 shares for his one director and make certain of his election.

Each share is entitled to as many votes as there are directors to be elected. A stockholder may scatter his votes for directors or vote all of them for one or two candidates. It is through this method of voting that minority stockholders are now able to elect representatives to the board of directors where formerly no representation was possible. The majority stockholders under this system cannot elect all the board.

The method is being gradually taken up by corporations all over the country. Pennsylvania has it included as a requirement for a charter.

68. *The Proxy and its Use.*—It is not required that stockholders personally attend the stockholders' meetings. They may send a representative who acts under their instruction or exercises his own judgment when matters arise not covered by the instructions. The authorization under which a representative acts is called a proxy. It may authorize one or more persons to act as representatives of any stockholder. The following is a typical form of proxy:

PROXY.
Nemo Home Telephone Co.

KNOW ALL MEN BY THESE PRESENTS THAT ———— ———— the undersigned, stockholder in the Nemo Home Telephone Co., do hereby constitute and appoint ———— ———— true and lawful attorney and agent of the undersigned, with power of substitution for and in the name, place and stead of the undersigned, to vote upon the stock held by the undersigned; as proxy at the annual meeting of the stockholders of said company to be held at the company's office ———— ———— ———— on the ———— day of —— 19—— and at any and all adjournments thereof, according to the number of votes the undersigned would be entitled to vote if then personally present.

Witness ———— hand and seal this ————day of ————, A. D. 1915.

Signed, sealed and delivered in the presence of

.....

.....(L.S.)

.....(L.S.)

A proxy is never irrevocable. No matter how specific its conditions, it may be revoked at will of the person making it. It is through the use of proxies and the failure of stockholders to attend or appoint representatives to attend the annual meetings, that it is possible for a corporation to be controlled by a person or persons possessing 30 per cent. and even less of the stock.

69. *Power of the Board of Directors.*—The board of directors has complete control over the assets and officers of a company. The influencing factor for this conferring of authority is probably that theoretically the board is supposed to equally represent all stockholders. The powers of boards of directors are different with the various companies, all depending upon the by-laws.

All ordinary business matters are discussed and acted upon by the board. It is only when some great problematical issue is up that the stockholders are consulted. In telephone circles, for instance, the board of directors purchases the new switchboard, but it is known that this matter has been left to stockholders more than once. Usually in such instances, the case has been made acute by the activity of the various salesmen of the different factories.

The board of directors generally has the power to appoint and remove officers of the company. In case of a vacancy in the board, the directors may elect a stockholder to serve until the next annual meeting of the stockholders for the election of directors. A resolution adopted by directors, or even stockholders, is not legally binding if contrary to any provision of the by-laws. The stockholders, however, have the right to change the by-laws.

As has been previously stated, the question of dividends is exclusively a function of the board of directors. The inside information which a director may possess relative to the suspension, decrease or increase of dividends has often been used for personal gain.

70. *Responsibility of Directors.*—In some places directors are supposed to direct. In Illinois, directors are responsible for debts piled up by a corporation beyond its capital stock. In many states directors are liable for wages, current bills and such items. It might be well for the many directors of telephone companies, who serve without pay, to investigate the depth to which their unselfish service may possibly carry them.

Directors cannot act for themselves and their companies simultaneously. They cannot make valid transactions in the interests of their own personal benefit; that is, if the stockholders object early enough. A postponement of the stockholders' protests merely ratifies the deal, however detrimental it may be to the company. If a director voted for a particular switchboard and happened to have stock in the company manufacturing the board, the whole deal could be voided. A majority of directors can make a deal with one director, if the stockholders are in possession of all facts.

71. *Personal Liability of Directors.*—It is generally held that directors are personally liable: For any loss to a corporation as a result of their neglect or wrong doing; for issuing stock as fully paid when such is not actually the case; for paying dividends out of capital, or doing any other acts that are specificially forbidden by the statutes of the state in which the company is incorporated. No liability attaches to them as directors so long as they confine their activities to the letter of the law.

72. *Officers and Committees of the Corporate Organization.*—The principal officers of a corporation are president, vice-president, secretary, treasurer, and general manager. Sometimes there is a chairman of the board of directors, a managing director, auditor, and general counsel. In cases where the board of directors is large there may be an executive committee which plans the activities of the company, and a finance committee which cares for the financing of the company.

73. *The President and His Authority.*—The president presides at all meetings of stockholders and directors. He is elected from the board of directors. He signs certificates of stock and all orders on the treasurer. He contracts obligations and approves all instruments of writing. He can call the directors together whenever it seems necessary to him.

At all times he exercises a general supervision and command over the affairs of the corporation. He has authority to employ counsel and the subordinate officers necessary to the proper conduct of the business. He can remove any officer, clerk or employe, although he must discuss the matter at the following board meeting. In some corporations the president is a figurehead, being chosen merely for the influence of his name; in other organizations he is supreme. All arrangements are governed however by conditions and objective points. The president may hold other offices in addition, except that of vice-president.

74. *The Vice-President and His Duties.*—The vice-president is the occupant of a more or less honorary position. In the absence of the president, the vice-president assumes all the duties and powers of the president. It has recently become customary to make vice-presidents of the heads of the various departments in railway and other large corporations. One vice-president may be in charge of purchases, another in charge of sales and still another in charge of shop matters.

The Bell telephone interests have a group of vice-presidents, but it will be noted that one is voted as the senior vice-president. Upon his shoulders falls the job to be acting president while the president is away beyond a certain period. Normally, the vice-president has no function beyond that of watchful waiting.

75. *The Duties of the Secretary.*—The secretary is elected by the board of directors. He is the keeper of the books, seals and other devices. He keeps and reads the minutes of meetings of the stockholders and directors. He has the custody of the stock books and attends to the issuance, cancellation and transference of all certificates of stock.

He affixes the corporate seal when it is required. He keeps proper books of stock accounts, countersigns all orders drawn upon the treasurer, and serves all notices required by law. Ordinarily, a good secretary is a joy forever; he is the source of knowledge of directors and officers. It is safe to say that good secretaries are born and not made.

76. *The Books Kept by the Secretary.*—The books which the secretary keeps are those of the corporate unit as distinguished from those of the line or operating unit. They vary in number depending upon the size of the company.

In addition to the minute book, the secretary's books may include: The stock transfer book in which is recorded the transfer of stock from one owner to another; the stockholders' ledger containing the stock accounts of the various stockholders; the stock subscription book which contains the names, addresses of stock subscribers and the number of shares taken by each; an installment book, used when stock is paid for in installments; and an installment receipt book which contains detachable receipts, having stubs which are filled out when receipts are issued.

The secretary does not have charge of the books and business of the company such as telephone subscriber's accounts, the help, supplies and expenses of the company unless such duties are assigned to him as a member of the line or operating organization. As has been previously stated the secretary is quite often the manager of the company.

77. *The Treasurer's Duties.*—The treasurer is elected by the directors. He is the financial agent and has charge of the money. He signs notes, checks vouchers and other financial instruments. He has charge of the company's books and makes up the financial reports. The dividend book is usually kept by the treasurer. This book contains a record of the stockholders, the numbers of shares and the amount of dividend to which each is entitled. In the larger corporations, the treasurer is the secretary of the financial committee. He is usually under bond.

78. *The General Manager.*—The general manager has charge of the industrial and commercial aspects of the business. He is the expert of the company, the physician in charge who takes care of the aches and pains of the business as a daily affair. He does not have to be a stockholder or a director. He is the prize hired man of the company. He has nothing to do with

corporate management as an entirety, and reports to the president and board of directors, also, if requested.

It is his duty to carry out the policies of the company as transmitted to him by the president or directors, in such a way as to obtain satisfactory results. It is through the general manager that orders are customarily transmitted to the members of the line or operating organization. While the president has authority to remove any employe he seldom exercises his power directly, the actual removing being done by order of the general manager. *(To be Continued.)*

Telephone Consolidation in Williams County, Ohio.

The Williams County Telephone Co. will soon make its bow to the Ohio Independent Telephone Association. The new company will be made up of former stockholders of the Bryan Telephone Co. and the Montpelier Telephone Co. and will operate the properties of these companies.

All of the exchanges in Williams county, including Bryan, Montpelier, Ney, Edon, Pioneer, Farmer, Pulaski, Williams Center and excepting exchanges at Edgerton, West Unity and Stryker will be operated by the new company. This new county unit will own and operate more than 3,500 telephones and a system of approximately 150 miles of toll lines throughout the county and extending into eastern Indiana and southern Michigan. The investment will exceed $200,000.00.

The various stockholders in interest have authorized the sale to the new company and it is believed the deal will be approved by the state utilities commission when presented to it. The reason for the consolidation is to bring about more efficiency in operating and to further the effort to put the business on a paying basis, provide new capital for growth and take care of necessary expansion.

Iowa Pole and Wire Tax Case Appealed.

The Iowa Telephone Co. has appealed to the state supreme court in the action brought by the city of Des Moines to recover $100,000 pole and wire tax as payment for use of the city streets.

The company lost the case in the Polk county court, judgment for $71,658.49 being rendered in favor of the city. The Iowa company claims the right to use the streets without payment of tax. The attorneys for the company assert that the courts ruled in 1903 that the Iowa Telephone Co. has a right forever to occupy the streets, avenues, alleys and other public places of the city of Des Moines.

The city of Des Moines has been attempting to force the telephone company to apply for a franchise to continue in business there and the pole and wire tax is said to be one of the methods employed.

If the supreme court affirms the decision of the Polk county district court in this case, the city of Des Moines will be entitled to collect from the telephone company the amount of the original judgment and $27,683 for every year after 1913 which the case has run.

Why One Man "Quit Cussin' Central."

Local Rotarians, at Louisville, Ky., are reading with interest (and talking about) the "Why Cuss? The Girls Can't Help It" booklet recently prepared by R. T. Arnold, at Jacksonville, Fla., and dedicated to Richard L. Boyd, district manager of the Southern Bell Telephone & Telegraph Co. This is an entertainingly written story of why the author "quit cussin' central." In it he describes what he found out by a visit to the exchange explaining the actual reasons for many of the mistakes that happen and showing that it saves time and makes for better service to put up with them and "quit cussin.'"

Telephone Company to Warn Farmers of Danger of Frost.

The United Telephone Co., of Monroe, Wis., is arranging to co-operate with the farmers in the section of the state in which it operates, in giving warnings of the approach of frosts which may injure the crops. The warnings will be issued by the Weather Breau of the United States Department of Agriculture stationed at the University of Wisconsin.

Kansas City Home Employes Enjoy Outing.

The employes of the Kansas City Home Telephone Co., including those employed in both Kansas Cities, were guests of the company last week at a picnic at Overland Park. The afternoon was given over to baseball games, field events and other athletic sports. At 6 o'clock a basket lunch was served, which was followed by dancing. About 2,000 persons were in attendance.

Meeting of Indiana Long Distance Operators.

The long distance operators of Indiana, both of Bell and Independent companies, will meet in Richmond on September 4 for the purpose of formulating uniform rules for better service. In addition to the business session the operators will be entertained socially, a dinner at the Cliffdale Auto House being a feature of the entertainment.

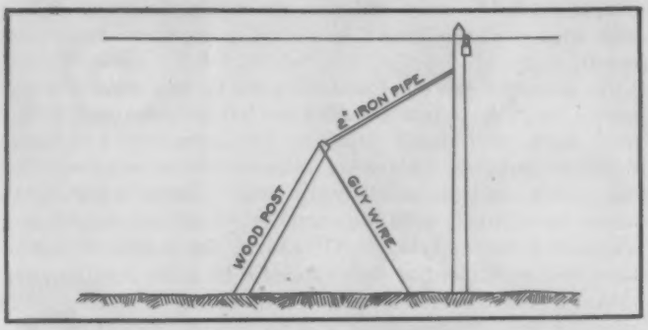
War's Devastation—Telegraph and Telephone Offices in Lemburg Destroyed by the Russians Before Retreating.

Practical Subjects—Letters and Discussions

A New Kind of Push Pole.

The accompanying sketch shows a new kind of push pole our competitor, a farmers mutual company is using—it works, too.

The farmers also have a new way of eliminating the use of manholes at corners. To get into their office, they had to put



Push Pole of an Iowa Farmers' Company.

in about 300 ft. of underground and make a corner. To save the expense of a corner manhole, the cable was laid on the ground, then pump logs pushed along the ground over the cable, then the whole thing rolled into the ditch. As most of the labor is donated, it makes a cheap way to lay cable, especially around corners.

It is funny how public spirited some people are. There are dozens of men in this town who have the Farmers Mutual telephone and will not have ours, at about the same rate, with a common battery plant, etc. They do it just to keep us from having a monopoly of the business, for they have been told that if we did not have competition, we would charge about five times what we do now. Is that public spirit or short-sightedness? An Iowa Reader.

Locating and Clearing Cable Troubles.

A few years ago there appeared in TELEPHONY a description of a method of locating wet or damp spots in a cable by means of a telephone receiver and a few cells of dry battery. The idea was to connect the receiver and battery in series with two bunches of the pairs in trouble in such a manner that the battery current would flow from the battery through one bunch of pairs and across to the other bunch, through the moisture in the cable and then back to the receiver and battery. The moist spot is a variable resistance and if the cable is jarred or knocked on near this spot, it will act very much like a transmitter. It will cause variations in the current flowing through the circuit and the noise of rapping on the cable sheath will be reproduced in the receiver.

It takes two men to make the test; one to listen at the testing receiver and one to ride over the cable and rap on the sheath with a piece of board. The man with the receiver and battery can usually find a terminal within sight of the section of cable that is to be tested. It is necessary that the two men be able to communicate with each other at all times, for when the man who is rapping on the cable begins to approach the wet spot, it will be faintly heard in the receiver and will get louder as he gets nearer to the trouble.

The wet place will be found where the rapping is heard loudest in the receiver. Those having a bridge can usually obtain, at least, an approximate location of the trouble, so only a short section of the cable will have to be ridden for this test.

This test is very useful for verifying bridge locations. It is often desirable to verify them as it is sometimes hard to see just where water has entered the cable in such cases as crystallized sheath and small lightning punctures. It is also often a great help to know just where the wettest spot in a cable trouble is. This test will always work if the pairs that are in trouble are used in making the test.

If the cable is very wet, it is possible to make the test by using just one pair. In a common battery exchange the wire chief can supply battery from the test board, in which case the man at the cable terminal needs only a lineman's common battery talking set.

When supplying battery from the test board, it will be seen that the receiver, battery and wet spot are not in series, as in the first case. The variable resistance caused by the moisture is bridged across the circuit, and when disturbed by rapping on the sheath, will set up variations in the current flowing in the circuit and the sound of the rapping will be heard in the receiver just as in the first arrangement.

A great many variations can be made in the arrangement of the cable pairs and the method of supplying battery for the test. In fact any form of common battery circuit using the wet pairs will work. Where the cable is only slightly damp, the worst pairs should be picked out and used in two groups, as in the first arrangement described, in order to make the resistance of the fault as low as possible.

I only use this test as a last resort on account of its slowness, but it has given results many times after all other tests had failed. This test does not seem to be generally known or used although it was published in TELEPHONY once before. I am writing this description of the test believing it will be a great help to any telephone man who has any cable troubles to deal with.

I will also give here some experience I have had with moisture trouble in the switchboard cabling of a common battery exchange. Considerable trouble has been experienced in some of the exchanges in the lowlands of the Southeastern states. Only last summer one exchange had to replace all of its multiple and answering jack cables on this account.

It seems that during the summer months the air is laden with moisture which is gradually absorbed by the insulation of the switchboard cabling. This condition usually manifests itself first by cross ringing. Once the generator current arcs across from one wire to another, the insulation is burned and weakened permanently. Of course the lowered insulation will be noticed in the periodical tests—if such tests are made—before the cross ringing appears. Usually, however, the cross ringing begins before the insulation shows very bad and the man in charge will be much surprised when he finds that he is getting cross ringing through his switchboard cabling.

A great many experiments have been made in an effort to find a remedy and a preventative for this trouble. Heat is the only remedy that has been found so far. As the remedy is needed during the hotest months of the year, it is hard to apply the heat where it is needed without making it very uncomfortable for the employes in the room where the cabling is located.

In this exchange we fought the moisture trouble for two summers with everything from a coal heater to electrical heating apparatus. It was found necessary to run several electric fans in the operating room, which is on the same floor, in an effort to keep it habitable. Our last experiment proved successful so I will give it in detail for the benefit of others who may be having trouble of the same nature.

We run partitions in such a manner as to completely enclose all cabling, the frames and the rear of the switchboard sections in one small room. This room was made as near airtight as possible and considerable glass was used in the partitions in order that the lighting would not be interfered with. We installed a gas radiator in the room and found that it would raise the temperature quite high in a short time without any noticeable change in the operating room.

In dry weather we run the radiator three or four hours at a

time about three times a week. In rainy weather or any time when the atmosphere seems very damp, we run the radiator all night at least every other night. The room is kept closed at all times. We occasionally open up the backs of the switchboard sections and allow the heated air to circulate through all the wiring. This is only a precautionary measure as we have never had any trouble inside the switchboard.

This treatment keeps everything dry and crisp at all times and there has been no sign of the slightest leak in the insulation of the cabling since it was started. The expense of running the gas radiator is negligible.

The cost of the partition was about $100. We consider it money well spent as it has completely removed our source of trouble and no doubt has added many years to the life of our cables. A Southern Reader.

Service Tests of Manitoba Government Telephones.

The results of service tests of the Manitoba Government Telephones in the provincial exchanges made during the year 1914, show that 95.4 per cent. of the calls were answered by the operator in 15 seconds or less; 90.9 per cent. in 10 seconds or less; 62.4 per cent. in five seconds or less; and 3.7 per cent. in two seconds or less.

The time required to complete the connection from the time the operator answers until the subscriber answers was 60 seconds for 88.5 per cent. of the calls; 30 seconds for 60.3 per cent.; 15 seconds for 12.9 per cent. and 10 seconds for 6.1 per cent. But 11.5 per cent. of the calls required over 60 seconds for completion. 93.5 per cent. of the calls were disconnected in 30 seconds; 70.8 per cent. in 10 seconds; 3.2 per cent. in two seconds and 6.4 per cent., over 30 seconds.

The average number of complaints per day was 10.3. The average number of complaints per 1,000 stations per annum was 10.

In the Winnipeg exchanges over 6,000 tests were made during the year 1914. The results show that 99.2 per cent. of the calls were answered by the operator in 15 seconds; 96.6 per cent. in 10 seconds; 90.4 per cent. in five seconds; 62.1 per cent. in two seconds, but .8 per cent. of the calls requiring more than 15 seconds.

The time required to make connections was 60 seconds or less for 99.9 per cent. of the calls; 20 seconds for 98.2 per cent. of the calls; 15 seconds for 78.6 per cent.; 10 seconds for 41.3 per cent.; and over 60 seconds for .1 per cent. of the calls. 99.8 per cent. of the calls were disconnected in 30 seconds; 98.2 per cent. in 10 seconds; 91.8 per cent. in five seconds; 68.2 per cent. in two seconds, and .2 per cent. over 30 seconds.

The holding time of connection for 72.9 per cent. of the calls was 120 seconds; for 29.8 per cent., 60 seconds; 14.3 per cent., 45 seconds; 2.7 per cent., 30 seconds, and 27.1 per cent. over 120 seconds. The average number of calls per line per day was 11.9. The average number of complaints per 1,000 stations per annum was 17.4.

Collections.

I am convinced that the average manager spends sufficient time on his collections, but I believe that in many instances the method is wrong, says one of the staff of the Federal Telephone & Telegraph Co.

Do not say to a man who is in arrears, "Can you pay something today?" That is a phrase I have heard used many times. It gives the man the impression that it is not imperative for him to pay today, and nine times out of ten, he will delay payment until a later date, even when he has the money in his pocket.

Approach a man in a manner to give him the impression that you must have his account today. Take the instance of a man over three months in arrears: He may say that he hasn't the money that day but will pay tomorrow. If you feel sure that this is the case, take that promise. (On arrearage accounts do not take a promise of more than seven days.) But explain in a forcible manner that you are stretching a point in giving him time and that if his promise is not made good you will discontinue his service. Then on the date he fixed for payment, if he does not make a settlement, refuse him service.

It is an important point to discontinue service on a date which you have specified, as otherwise he will say that you were "bluffing." It doesn't pay to "bluff," for the other fellow may call you on it and then that fellow will always in the future be delaying payment on his account.

An instance of this nature came to my attention the other day. A collector called on a man who had in the past been continually delaying his payments and never kept the promises he made. The collector asked him for his account and the man's reply was: "I haven't any checkbook here but I will have a check here for you at ten o'clock in the morning." Of course the collector had to take this promise, but he explained, in a forcible manner, that he was stretching a point in giving him any more time on his account, as it was in arrears, and that if not paid in the morning, he would discontinue his service.

He called on this man in the morning and he was out. His wife explained that he must have forgotten it, and would take care of it upon his return as she could not draw a check on it.

The collector merely said: "I am sorry but I took special pains to explain to Mr. R—— that I must have his account this morning so that he would not feel I was taking advantage in any way by discontinuing his service." He turned to leave, but Mrs. R—— said: "Just a moment. If that is the case, I guess I have the money here to pay it."

She knew that the collector was not "bluffing." If he had left upon that promise to pay, this account would still be delaying.

Mean business and let the subscriber know that you do.

Code Card to Avoid Errors in Telephoning.

A code card to be hung near the telephone and used when in doubt as to the correctness of an initial or word, has recently been issued by the Western Union Telegraph Co. to its patrons. By giving the word in the code for which the letter stands, errors due to the phonetic similarity of different letters over the telephone will be prevented. The code card reads as follows:

A for Adams.	**N** for Newark.
B for Boston.	**O** for Ocean.
C for Chicago.	**P** for Peter.
D for Denver.	**Q** for Queen.
E for Edward.	**R** for Robert.
F for Frank.	**S** for Sugar.
G for George.	**T** for Telegraph.
H for Henry.	**U** for Union.
I for Ida.	**V** for Violet.
J for Jersey.	**W** for Western.
K for King.	**X** for X-Ray.
L for Lincoln.	**Y** for Yale.
M for Mary.	**Z** for Zero.

Underground Cable Construction at Herington, Kan.

The United Telephone Co. has a force of men at work laying underground conduit and cable at Herington, Kan. Approximately two miles of underground conduits will be laid. Cables will be pulled in ranging from 200 to 400 pairs. The cost of the work is estimated at $7,500.

Queries on Theory and Practice

Magnetizing Steel Magnets of a Magneto.

In the course of my experiments I have come across the following problem: To energize the magnets of a common magneto with an outside battery. Can this be done successfully? If so, please give winding data as closely as possible.

We do not understand your sketches. If you mean to use the battery and coils to reduce the weight of a magneto generator, we fear that you will be disappointed. At any rate, the cost of dry cells will be excessive, since rather heavy current will be required and they will run down rapidly.

To magnetize the steel magnets of a magneto, while in position you should apply about 300 ampere-turns, certainly not less than 200 ampere-turns. You can figure out for yourself how many turns it will take. If you have but one ampere, then it will take 300 turns. If you can put through two amperes, then only 150 turns will be needed. If you can give us definitely the voltage available and how many amperes you care to use, we can give you more close figures.

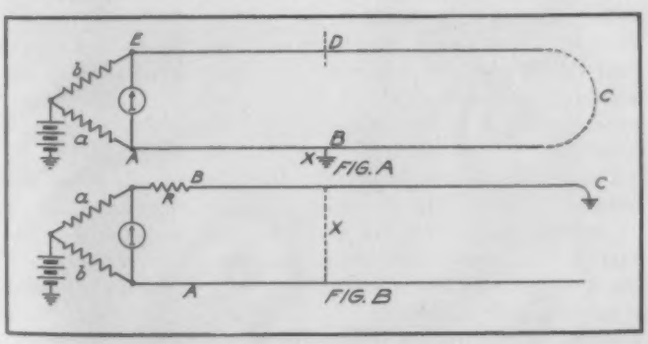
Some Line Testing Problems.

In Fig. *A* is represented an open wire metallic toll line grounded at *X* and strapped at *C* for testing. From *A* to *X* = 1,240 ohms, and *E* to *X* = 1,560 ohms. Will the difference of these measurements in ohms compare favorably with the resistance of the loop *B* to *D* through *C*? Please illustrate best method for location of a ground on long or short metallic lines.

Fig. *B* represents an open wire, metallic toll line grounded at *C* for testing with a resistance cross at *X*. The resistance from *B* to *C* equals 400 ohms and from *A* to *C* it equals 900 ohms. Will *A* through *X* to *B* = 820 ohms if the cross is four miles from *BA*? Line resistance is 80 ohms per metallic mile.

Please illustrate the best method for the location of such trouble.

You can tell nothing about the location of the leak by comparing the two readings. You must, in addition, know the



Conditions of Problems.

loop resistance from *A* through *C*, back to *E*. If $2L$ = the loop resistance, then the resistance from *A* to the leak is $L - 160$. The general formula is:

$d = L - \frac{R_2 - R_1}{2}$ in which d = resistance from *A* to the fault.

L = resistance of one wire (from *A* to *C* or *E* to *C*, both alike).
R_1 = resistance from *A* through the leak to earth.
R_2 = resistance from *E* through *C* and back through the leak to earth.

This method is likely to lead to error if there is appreciable earth current, because it will give a false and varying value to the earth resistance.

The best method is any good loop test, which eliminates the earth resistance. First measure the loop resistance, and call it *R*, then connect the bridge as shown in Fig. *A*. Balance. Then

d, the resistance to the leak, will be $d = \frac{a\,R}{a+b}$.

Example: Let $a = 100$, $b = 300$, $R = 100$. Then

$$d = \frac{100 \times 100}{100 + 300} = \frac{10{,}000}{400} = 25 \text{ ohms.}$$

If both wires are alike and the resistance of the leak between them is constant, the resistance from *A* through *X* to *B* (Fig. *B*) will be 820 ohms as you suggest. But on account of earth currents it is not advisable to depend upon results obtained this way.

A better test is a variation of the bridge method. First connect as in Fig. *B*, but with the resistance $R = 0$. Let *a* and *b* be the proportional arms, which will balance. Then let *R* be given a known value, and balance again. This time the two arms will be *a'* and *b'*. Then *d*, the resistance to the fault, will be $d = \frac{ab'\,R}{a'b\;ab'}$.

Example: $a = 320$, $b = 1{,}320$, $R = 200$, $a' = 180$, $b' = 330$.

$$\text{Then } d = \frac{320 \times 330 \times 200}{(180 \times 1{,}320) - (320 \times 330)} = 160 \text{ ohms.}$$

Delivery of Portable Telephones Under Fire.

The delivery of telephones under fire seems to be a bit more exciting than the prosaic delivery of the same type of article in neutral countries where the instrument is used, not to pave the way for the decimation of an infantry brigade or an artillery battery, but to facilitate the transportation of a hogshead of sugar or reserve a box at the theater. TELEPHONY'S London correspondent learns that deliveries out in France and Belgium are made "on the run."

"I suddenly got an imperative order," said the sapper of the signal section of the Royal Engineers. "It was in an envelope. There were 50 portable telephones to be distributed to the various army corps and I was put in charge of the job. I had a driver and two other men of the A. S. C. Besides the telephones there were four miles of wire on drums and a packing-case full of instruments. We started out full pelt in the motor lorry. We crashed and bumped in and out of towns, charging through hedges into fields and back into the roads again to avoid unpleasant encounters. In one of the semi-Flemish towns I delivered some of my telephones and took a receipt under fire. From this place we went on to another town, taking short cuts across meadows and parks and leaving our instruments and wire where specified.

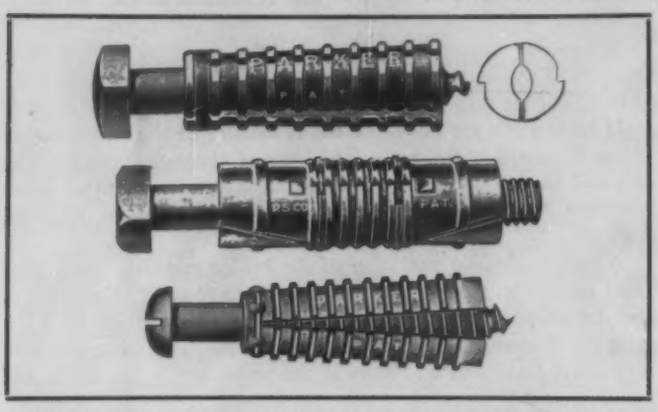
Then we got the order to go 'like blazes' to the next town. The stuff was urgently wanted—the Germans were shelling the roadway and the British were unable to direct their own artillery. We made it all right, although I had to sort myself out from field telephones and yards of wire and telephone apparatus before we could make our final delivery. The telephones connected up right away and the British began to make things warm for the German batteries before we left. The enemy tried to cut us off on the way home but we returned all right and were complimented for our work. But I'd hate to be some of those soldier-linemen who sometimes have to lie on their stomachs to make their telephone connections or dig themselves into the earth like groundhogs."

From Factory and Salesroom

Convention: Indiana Independent Telephone Association, Indianapolis, September 15 and 16

Parker Expansion Bolts.

An expansion bolt provided with lugs to prevent it from turning has recently been developed and placed on the market by the Parker Supply Co., 527 W. Forty-fifth street, New York. The reversibly directed projections shown in



Parker Lag Screw Type, Machine Bolt Type and Screw Anchor.

the cross section in one of the accompanying illustrations, are said to prevent the shield from turning in the hole. The circumferential ridges, the manufacturer points out, insure a proper resistance to stress in the direction of the line bolt. The steel spring band, shown in another illustration, holds the halves of the bolt together and on account of its flexibility allows the shield to expand freely. A feature of the Parker bolts, which will be appreciated by its users, is the provision of little pins on the outside of the nuts which lock into openings in the shield, preventing the shield from coming apart and thus eliminating re-assembling.

The outside of the Parker machine bolt type is ribbed over its entire length. These ribs, together with the reversibly directed projections, are said to not only prevent the shield from turning in the hole, but enable it to obtain a much better and more substantial grip. Both the lag screw and machine bolt types are made of malleable iron.

The Parker screw anchor is made extra heavy at the ends to increase its holding power. At the base the anchor is joined by two breakable connections which prevent the anchor from taking a cork-screw twist when subjected to the torsion produced by the entering screw.

The Parker Supply Co. also manufactures several types of toggle bolts, brick and stone drills and other engineers' and sheet-metal workers' specialties. Further information and descriptive literature may be obtained upon application to the company.

Matthews Anchors Guaranteed Against Breakage.

W. N. Matthews & Brother, of St. Louis, Mo., recently conducted an investigation as to the number of Matthews anchors which are broken either in transit to their customers or in handling by the men before or during installation. The number of instances in which the helix casting was broken was so much under one per cent. as to make this possibility practically negligible. No case was found where the malleable eyes were broken or where the threads on the malleable eyes had stripped under strain.

As a result of this investigation, W. N. Matthews & Brother have decided to replace any casting, whether eye or helix, of a Matthews Scrulix anchor that has been broken in transit to the customer or by the customer's men before or during installation, free of cost. They further guarantee that the threads in the helix and the eye of the five, six and seven-inch anchors are equal in strength to the rods to which they are attached.

The following facts, Matthews & Brother contend, make the purchase of Matthews Scrulix anchors a can't-lose-proposition: The fact that Matthews Scrulix anchors have no steel in them, the eyes being made of the best grade of malleable iron galvanized; the fact that the rods are made of ungalvanized Armco iron (guaranteed to outlast galvanized steel rods of the same cross-section) and that the helices are made of the best grade of gray iron; plus the further fact that the increase in sales and a perfection in manufacturing methods have brought about an average reduction in price of 25 per cent.

The New Kearns 1,000-Pound Motor Truck.

In a recent interview M. C. Kearns, president of the Kearns Motor Truck Co., of Beavertown, Pa., said in part:

"The motor truck is being more and more recognized as something more than a luxury. Its perfect delivery and economical upkeep costs, are indeed an inducement, but on top of this is the fact that the motor truck is a much better advertisement than any other sort of conveyance. To illustrate my point:

If you and I were walking along the street and saw a car whose appearance was strange, or even familiar, wouldn't we comment on that car and try to guess what make it was? And if the name stood for quality, wouldn't we admire the fellow that owns the car, for his wisdom in making so wise a purchase?

Just so it is with the motor truck. Telephone companies have just recognized this valuable asset—the motor truck. When you and I see a motor vehicle on the street with an advertisement lettered on it, we read it with more interest than if it were on a buggy or a horse-drawn conveyance. And that's why the motor truck is proving so good an advertising medium. Call it environment if you will, but nevertheless it is an indisputed fact that these points are true."

Further on in the interview, Mr. Kearns was asked the question, "How will the motor truck and motor car be of service to the railroad and telephone companies?" He replied: "In these days, when the storms are threatening, the lineman gets his tackle ready. Just as soon as the first trouble report comes in over the wires to 'Central,' the lineman is ready. All that he needs to do is to jump into the truck, loaded with the necessary supplies and tools and drive to the scene of operations."

"Or," said Mr. Kearns, "if you want to use a truck for the lighter work, don't purchase a big, heavy car, but buy a small light car, like the Kearns. It will see you through the hard weather."

The Kearns Motor Truck Co. has recently placed on the market a 27 horsepower truck of 1,000 pounds' capacity, which is especially adapted for the use of telephone companies in construction and repair work. This truck has three speeds forward, one reverse, selective sliding gear, central control, and is equipped with an electric starter. Disco driven by a silent chain, encased and dustproof. The wheel base is 107 inches and the weight of the car is 1,000 pounds. The engine is of the Lycoming type, four cylinder, four cycle and water cooled. The Kearns truck

is furnished either with a closed body or an open body with side curtains. The size of space back of seat is 44 by 60 inches, in addition to 14 inches of space under the seat.

In a letter addressed to the Kearns Motor Truck Co. shortly before his death, Elbert Hubbard highly indorses the Kearns motor truck.

The factory of the Kearns Motor Truck Co., at Beavertown, Pa., is operated on much the same plan as the Roycroft shops, at East Aurora, N. Y.—Elbert Hubbard's great institution. Mr. Kearns also gives his employes a share of the profits and all of them are stockholders in the company.

Further information relative to the Kearns motor truck will be sent to interested parties upon request.

Paragraphs.

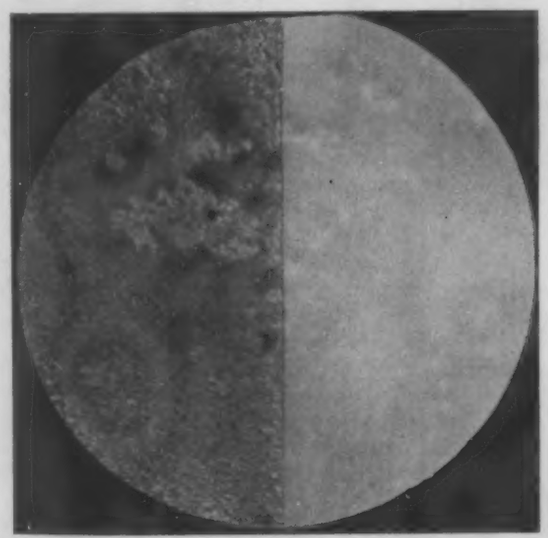
THE GARFORD MFG. CO., of Elyria, Ohio, is now established in its new branch headquarters in Kansas City, Mo. The street address is 1322 Main street, the location being less than two blocks from the main business district. The company recently received an order from the Center Telephone Co., of Olpe, Kan., for complete new central office equipment.

THE YESBERA MFG. CO., of Toledo, O., has just prepared and issued to the trade an attractive folder descriptive of Yesbera folding door booths. This folder presents a number of Yesbera booths, their mechanism and operation and gives a detailed description of their construction. Copies of this folder will be sent to interested companies upon request.

THE AMERICAN ROLLING MILL CO., of Middletown, O., has issued a booklet entitled "Next to Excellence is the Appreciation of It," containing some expressions of the estimate placed upon Armco-American ingot iron by those who are using it. In this booklet are reproduced some 30 testimonials received from users of Armco iron for various purposes. Copies of the booklet may be obtained upon request.

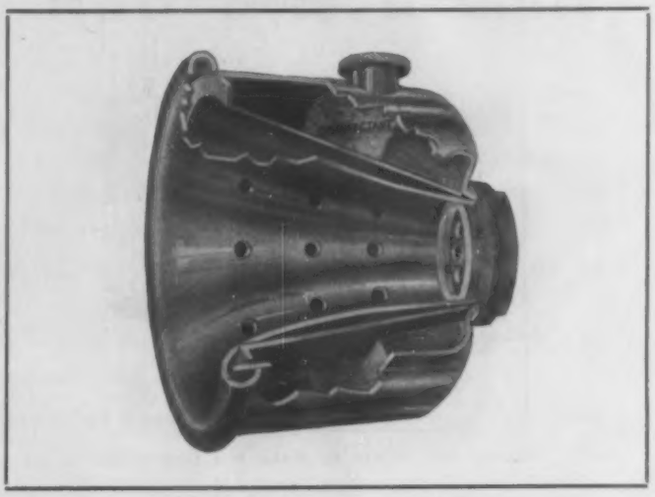
Sanitary Transmitter Mouthpiece.

It is contended by many that the ordinary transmitter mouthpiece is a source of danger as a common carrier of disease. Cultures made by Drs. J. H. Black and Jewel Daughety, of the Southern Methodist University, Dallas, Texas, show the danger of infection from the ordinary transmitter mouthpiece.



Infection from Mouthpiece—Absence of Infection in Aseptifone.

To overcome this danger, a sanitary mouthpiece, known as the Aseptifone, has been devised and placed upon the market by E. M. Jenkins, M. D., Ph. G., of Italy, Texas. This transmitter mouthpiece, a sectional view of which is shown in one of the accompanying illustrations, consists of a plurality of shells. The inner shell has a threaded portion for attaching to the transmitter. An annular flange extends laterally from the outer end of the inner shell so as to confine and embrace the other shells. The outer shell has provision for storing a disinfectant within it. An intermediate shell has means for admitting the disinfecting fumes from the outer shell, while the inner shell is constructed so as to disseminate the fumes. The construction is clearly shown in the illustration.



Sectional View of Aseptifone.

The micro-protographs reproduced in one of the accompanying illustrations were made by the Millwee X-Ray Laboratories, Dallas, Texas, from the cultures of Drs. Black and Daughety, of the Methodist University. The left half of the illustration shows the heavy infection in the ordinary telephone mouthpiece, while the other half shows the absence of infection in the Aseptifone just described. Further information relative to this device may be obtained upon request.

Annual Outing of Stromberg-Carlson Employes.

Saturday, August 14, was the day set aside for the ninth annual outing of the employes of the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y. The day turned out to be ideal for an outing and at 8:30 a. m. 500 merry picnickers started from the company's main office for Manitou Beach, the place which had been selected for the scene of pleasure. Manitou Beach is one of Rochester's popular summer resorts and is located on Lake Ontario about 14 miles from the heart of the city.

The program planned for the day included athletic events of all kinds which were run off soon after the arrival at the grounds. The features of the day, which stirred up considerable interest, were the two ball games. The teams were selected from different departments of the organization. The first game between the Blues and Reds were begun at 10:30 a. m. Roy McCanne captained the Blues and J. S. Gibson had the Reds in charge. A very exciting game was played, the Blues defeating the Reds by a score of 24 to 21.

At 2 p. m. the Office team played the Factory team. The captains of these teams were C. H. McConnell and C. Dassan, respectively. That the game was a good one is evidenced by the fact that at the end of the fourteenth inning neither team had been able to score the deciding run and the game was called as darkness was fast creeping on. The score was 7 to 7.

The annual outing of the Stromberg-Carlson company is a day that is looked forward to by the entire organization. A band was in attendance all day and there was dancing in the evening.

Phoney Bill, a Golf Enthusiast.

Even Phoney Bill in his untiring efforts as a "Quality Apparatus" booster, finds time to play a few holes of golf now and then. The accompanying reproduction from the September blotter calendar of the Stromber-Carlson Tele-

Phoney Bill Ready to Make His First Shot.

phone Mfg. Co., of Rochester, N. Y., shows Phoney Bill at the first tee with his driver in hand, presumably measuring the distance with his keen eyes preparatory to making his first shot. Bill is dressed in the latest sporting attire, for he believes in being up-to-date in clothes as well as in telephone apparatus and equipment. With his usual "smile that won't come off," Phoney Bill says: "Use Quality Apparatus" and your telephone troubles are over.

Book Reviews.

How to Make a Transformer for Low Pressures, by Prof. F. E. Austin, Hanover, N. H.; 14 pages, 4½ ins. by 7 ins., with illustrations. Price, paper, 25 cents.

For experimental purposes, special transformers are sometimes desired which will give a variety of pressures. This booklet gives detailed instructions as to the construction of a transformer for stepping down the voltage from 110 to as low as 8. The various connections of the windings for obtaining different voltages are explained. It is stated that performance of transformers built according to these instructions has been remarkably good.

Directions for Designing, Making and Operating High Pressure Transformers, by F. E. Austin, Hanover, N. H. 46 pages, 4½ ins. by 7½ ins. with illustrations. Price, paper, 50 cents.

In this booklet, points relating to the design of a transformer are first taken up, after which the practical calculations involved are considered. Details of the construction of a three-kilowatt, 20,000-volt transformer are then presented, sketches being used to make clear the text. Estimates of the costs of materials entering into the construction of transformers according to the design presented are given.

Purchasing; Its Economic Aspects and Proper Methods, by H. B. Twyford. Published by D. Van Nostrand Co., New York; 236 pages, 6 ins. by 9 ins. with charts and diagrams. Price $3.

Expenditures are necessary in every business to carry on its activities. Many books have been written as to the proper use and care of the materials after purchasing, but very little has appeared relative to the economies which may be effected by efficient methods in the purchasing of materials, goods and supplies. It is of these methods that this book treats.

In order to direct attention to the importance of efficient buying, a chart showing the results of inefficient purchasing as compared with competent buying is presented together with a discussion of the principles of purchasing. The importance of good buying in every concern, no matter how small, is emphasized by pointing out that it is a component part of the activities of the concern as a whole. The ability to buy the best from a utilitarian point of view, for the lowest price, is stated to be the first step in the profits.

In the discussion of the ethics of buying, the relations between buyer and seller and their obligations are fully considered, together with practices which should be discontinued. The purchasing agent should be possessed of certain fundamental facts and these are shown diagrammatically. The main divisions of his work with the principal details of each division are then pointed out and his relation to the heads of other departments discussed.

The functions and activities of a purchasing agent are considered under these four heads:

The consideration of purchasing as a whole, its various phases and the manner in which it can be divided to obtain the most efficient results.

The organization of the personnel of the department to take care of the work of each division.

The system or method of procedure to be followed by employes in doing the work allocated to them.

The actual operation with the necessary forms for carrying out the work.

A chapter on stores and their keeping is of interest as considerable information is furnished relative to the proper methods of receiving, keeping and dispensing store materials.

The concluding chapters of the book consider purchasing systems and methods used by various kinds of concerns, both large and small, which illustrate the practical application of the principles previously discussed.

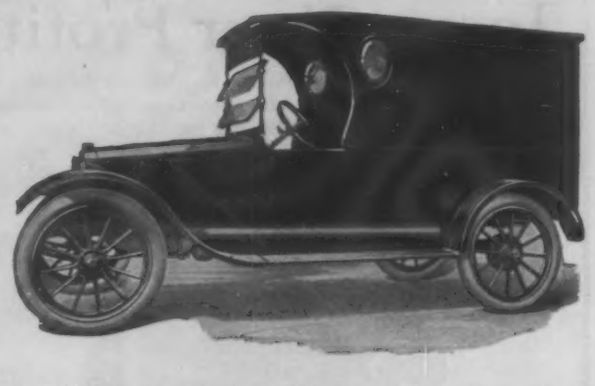
The book is well illustrated with diagrams and charts which clearly show the points brought out in the text. Telephone companies, with their purchases in so many varied lines, will find considerable of value in this work.

P. B. X. System in a London Department Store.

The P. B. X. switchboard in the department store of Selfridge & Co., London, Eng., has recently been enlarged to nine positions, with 60 lines and 265 extensions. As typical of the methods adopted in dealing with telephone orders, D. H. Kennedy, in a paper presented before the Telephone & Telegraph Society of London, describes the events which take place in the case of a call for the Selfridge store, as follows: The subscriber, asking for "Gerrard 1," is connected to the Selfridge operator who replies, not by saying "Hello!" or "Who are you?" but by using the word "Selfridge." The caller then usually asks for the department desired. The operator replies, "Do you wish to give an order?" If so, the connection is made with a telephone order line.

The telephone order clerk is provided with two lines, an incoming line over which the customer's demands are received, and an outgoing line which enables the order clerk to communicate with any department in order to settle any matter of doubt. The customer's orders are written down on appropriate forms and passed to the departments for execution. A customer inquiring about an article purchased, on a visit to the stores, is connected direct to the department concerned, and calls for the hair dressing, manicuring, and drug departments are put through direct.

The Selfridge exchange operators each handle about 900 calls per day. In their new department on the south side of Oxford street, Selfridge & Co. have introduced a new feature, which has been widely advertised. Ladies wishing to give orders which refer to a number of departments are provided with comfortable chairs and tables, and the services of assistants, and at their elbows are placed desk telephones. The assistants take particulars of the articles required, samples are brought immediately for the inspection of the customer, and if she desires to consult with her housekeeper or cook on any



What Does It Cost?

While you are getting ready to build that new line, and your Directors say, "What does it cost?" have you thought that "Drayage," "Hauling," "Livery Hire," are pretty big items in the estimate?

Why not pull down the total by using the Kearns Motor Truck, the truck of dependability, of efficiency, and of satisfaction?

Kearns Trucks run at a cost of 2¾c per mile. Also they have electric starter, electric lights, electric horn, windshield, and full equipment, and sell at $785.

For the troubleman, the lineman, the builders—for everything—use the Kearns. You'll not regret it.

Let us give you more information.

Special Price to Telephone Companies

Kearns Motor Truck Company, Inc.

Beavertown, Pennsylvania

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

THIS Emblem is rapidly becoming one of the most widely known trade marks on this continent; but even though it belted the earth, it could not stand more staunchly than it does today for the business principles underlying J-M Responsibility.

The Smooth Bore of J-M Fibre Conduit prevents damage of the Sheath, 90% of your line trouble

And there isn't anything easier than coupling up a joint on a J-M Fibre Conduit. Every time you make a joint the duct is 5 feet longer. It costs very little to haul and handle it, owing to its extreme lightness. Its interior is as smooth as the "lead covered" you pull into it, and when the job is done there is a sound cable in the duct.

Its dielectric strength is enormous. It has a puncture test of 24,000 volts after immersion in water for 200 hours, voltage terminals being applied through a conduit having ¼-inch wall. Doesn't this argue well for its ability to stand short-circuit conditions in the presence of seepage?

J-M Fibre Conduit is mechanically strong and absolutely homogeneous in structure. Approved by the Board of Fire Underwriters.

It is the logical material for your requirements regardless of what you are using or intend to use. Write for all the facts. They are convincing.

Southern California; Edison Co. Los Angeles, Installing J-M Fibre Conduit

H. W. JOHNS-MANVILLE CO.

Atlanta	Cincinnati	Galveston	Memphis	New York	St. Louis
Baltimore	Cleveland	Indianapolis	Milwaukee	Omaha	Salt Lake City
Boston	Columbus	Kansas City	Minneapolis	Philadelphia	San Francisco
Buffalo	Denver	Los Angeles	Newark	Pittsburgh	Seattle
Chicago	Detroit	Louisville	New Orleans	Portland	Toledo

Toronto — THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED — Montreal, Winnipeg, Vancouver

For Great Britain and Continental Europe:
TURNERS & MANVILLE, LTD., Hopetoun House, 5, Lloyds Ave., London, E. C.

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Vacuum Lightning Arrester

A model of the most efficient form of lightning protection—the VACUUM ARRESTER. Extremely sensitive to all static currents, giving absolute protection to your lines and equipment.

Use them and watch your maintenance charges drop.

Drop Us a Line for Our Catalog and New Prices

L. S. Brach Supply Co.
129 Sussex Ave. Newark, N. J.

No. 36

Insure Your Profits

If you KNOW the exact time in minutes and fractions of a minute your Toll Lines are in use, you can collect pay for all "excess minutes" or "overtime."

The CALCULAGRAPH

will tell you. It makes a printed record of Elapsed Time. Impossible for it to make a mistake.

Calculagraph records have been known to increase toll receipts enough to pay a dividend.

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1416 Jewelers Building **New York City**

4000 VOLTS

—that's what this

GRINNELL REZISTOL Glove

leather has been tested to resist. These are the gloves for you—the gloves that stand hardest and continuous wear, yet are light and soft and easy to work in. They wash in soap and water or gasoline—come out like new.

4315 P. R. F.
Style No. 9999
Per pair, $2.00

You ought to have these great Grinnell Rezistol Gloves on your hands right now—and

Here's the way to get a pair FREE

Ask your dealer for Grinnell Gloves. If he doesn't carry them, send us his name. With his first order we'll include a $1.00 pair (not Rezistol) for you, absolutely free. Write us for glove booklet and sample of Rezistol leather.

Morrison-Ricker Manufacturing Company
133 Broad Street, Grinnell, Iowa

You will find their full description and prices on pages 5 and 7 of our new catalog.

The Barnes & Kobert Mfg. Co.
MILLDALE CONN.

question of domestic economy which she may be dealing with, the telephone enables her to make free calls for this purpose.

"Whisperphone" Meeting With Favor in England.

The "Whisperphone," which appears to be in quite frequent use in England, is claimed to be absolutely hygienic and has received praise for this feature alone from British medical journals. The device can be carried in the pocket and its cost is nominal. It fits into the transmitter, its efficacy being due to an arrangement of internal spiral wiring which leads the vocal sounds to the correct point of the transmitter and at the same time getting rid of the breath exhaled into the telephone. It is rendered safe from infection by the acquisition of a special antiseptic chamber with chemicalized pads that are renewable every three months.

The device is made of cast and polished aluminum. The sound waves have no obstruction to overcome as the transmitting diaphragm is only vibrated by the voice sounds. The antiseptic ring which gives off disinfecting qualities when the warm breath is passing over the surface of the ring is fitted into the antiseptic chamber. By placing one's mouth into the "whisperphone" the user can talk in a soft, low voice and be distinctly heard the other end of the line. When there are persons in a room and the user wishes to speak privately over the telephone this device appears to be very welcome. The British Journal of Nursing says: "The Whisperphone seems likely to be a valuable addition to the telephone system." The Lancet says: "Its attachment to the ordinary telephone is said to accentuate the sound waves projected upon the diaphragm. We have tried it on the trunk lines and the audibility of the messages was distinctly improved." The patentees say the device is sanctioned by the postmaster general of Great Britain.

Operator Aids in Capture of Automobile Bandits.

The quick action of Miss Madelyn Yeager, night telephone operator at Perrysburg, Ohio, a suburban city about ten miles from Toledo, resulted in the capture of four automobile bandits. One evening at about 11 o'clock the Toledo police department received an anonymous communication stating that a party of five men had left Toledo to "pull a job in Perrysburg." The night captain of detectives telephoned Miss Yeager and read the note to her. The plucky operator immediately notified the sheriff, his deputies and then proceeded to arouse the populace. As a result, when the bandits arrived several posses were in waiting and the thieves were captured and locked up.

Ziegfeld's 1915 Follies Features Transcontinental Service.

A novel feature of the Ziegfeld "Follies of 1915" is a huge map of the United States, which taxes the limit of the stage. Sticking in the holes, which indicate the cities through which the transcontinental telephone line runs, are the heads of some of the chorus girls. It is said that flashing electric lights, to show the location of the cities, are not in it with the flashing eyes of the chorus, which sings the refrain of "Hello, Frisco!"

Legal Cases and Decisions

By A. H. McMillan

Warranty Subject to Telephone Rights.

A land owner made a contract by which he agreed to sell his land. Instead of performing the contract, he conveyed the land to his daughter-in-law, who had full notice of the existence of the contract. Suit was brought for specific performance of the land contract, and the court ordered the defendant to perform it.

The evidence showed that a telephone company had acquired certain rights over the land for which the vendee in the contract had accepted payment. The court held that the plaintiff was entitled to a deed which should convey to him a good title to the property subject to the rights of the telephone company which had been acquired by it since agreement. Noyes vs. Bragg, 107 Northeastern, 669.

Fall of Telephone Pole.

Where, in an action for injuries to an employe by the fall of an electric pole on which he was at work, the complaint alleged that the employe was working under the orders of the local plant superintendent and the employe testified that it was his duty to follow the instructions of the plant foreman, a charge of the court to the jury submitting the law of fellow servant was held to be authorized. The negligence charged was the failure of the company to inspect the pole. A judgment for the defendant telephone company was sustained. Bridgeman vs. Southern Bell Telephone & Telegraph Co., 84 Southeastern, 711.

Reasonable Facilities.

The check weighman at a coal mine sued a telephone company because of the failure of his brother to notify him of their mother's death. He alleged that it was due to the negligence of the telephone company in failing to establish a proper connection.

A judgment for the plaintiff was reversed because the plaintiff's petition alleged a contract on the part of the telephone company to transmit and deliver a message, while the evidence showed merely an undertaking by the company to furnish reasonable facilities or opportunity for a telephone conversation. Gainesboro Telephone Co. vs. Buckner, 169 Southwestern, 1,000.

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

Personal.

GEORGE KILLIE, of Newton, Kan., has been appointed local manager of the Missouri & Kansas Telephone Co., at Halstead, Kan.

W. R. JOHNSON, for the past five years district manager of the Lincoln Telephone & Telegraph Co., with headquarters at Hastings, Neb., has resigned to engage in the Florida land business with his brother under the name of the Federal Realty Co.

D. D. CARRICO, formerly manager of the Stanford, Ky., plant of the Cumberland Telephone & Telegraph Co., has been appointed district plant supervisor with offices at Frankfort, Ky. Before leaving Stanford, where he re-organized the plant and brought it to a high state of efficiency, he was given a banquet by telephone patrons, an unusual distinction. Officials of the company presented him with a handsome watch-fob and charm on the occasion of his leaving for the new post.

New Companies and Incorporations.

WHITESBURG, KY.—The Whitesburg Telephone Co. has been organized here with M. A. Creech as president and installa-

Western Electric Co.

CODE 1317

MAGNETO COMPACTS

LIKE CUT

3-Bar 500 Ohm Bridging Complete, Less Batteries, each $5.40

3-Bar 1000 Ohm Bridging Complete, Less Batteries, each $5.50

2-Bar 2500 Ohm 4-Party Complete, Less Batteries, each $5.60

The above sets are all equipped with Western Electric Co. Standard No. 250-W Transmitters and No. 143-W Concealed Cord Receiver, as well as their No. 13 Induction Coil and are of the Dark Oak Finish.

We guarantee all of our Rebuilt equipment to be equal to new. Money refunded if not satisfied. "Rebuilt once used always used." May we not have a trial to convince you?

Rebuilt Telephone Equipment Company

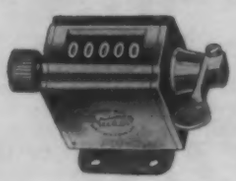
2127-2129 West 21st Street Chicago, Ill.

Veeder Small Set Back Counters

for

Telephone Switchboards

One Turn of the Knob Resets to Zero



Indispensable for Making Traffic Records

One-half Size

As it is desirable that telephone exchanges learn periodically the comparative amount of work performed daily by the operators as well as the total number of calls answered daily, this counter is almost indispensable to an up-to-date exchange.

Write for Catalog which Gives a Complete Description

The Veeder Mfg. Co.

11 Sargeant St., Hartford, Conn.

Cyclometers for Bicycles and Motorcycles, Odometers for Automobiles and Horse Drawn Vehicles, Counters for Practically Every Possible Purpose, Tachometers, Tachodometers, and Fine Die Castings.

tion of a system which will provide about fifty stations is under way. These stations will enjoy free service with about 765 telephones outside of town and connection with long distance lines.

WESTERLO, N. Y.—The Westerlo Center Telephone Co. has been incorporated with the secretary of state to operate a line from the home of Enos B. Scofield in Westerlo to the town of Dormansville, a distance of six miles. The directors are: Enos B. Scofield, Eddy C. Hopkins, Henry Beck, Byron Lockwood, Clifford Lockwood, Frank Snider, and Fred Chamberlain of Westerlo. The company begins with $170 capital.

COLLINSVILLE, OKLA.—The Eureka Rural Telephone Co. has been incorporated with a capital stock of $550. Incorporators, George Esau, W. H. Just and H. L. Loowen, all of Collinsville.

CLOUD CHIEF, OKLA.—The Farmers Telephone has been recently incorporated with a capital stock of $3,000. The following are the incorporators: W. R. Leverton, E. T. Plumbe and H. Gernert.

ROSLYN, S. D.—The Roslyn Mutual Telephone Co. was recently incorporated with a capital stock of $10,000. S. J. Reed, A. O. Hagen and Ole Heggin are the incorporators.

CHRISTIANA, TENN.—The Christiana Telephone Co. has been incorporated with $1,000 capital by H. H. Clark, A. N. Miller, N. D. Ellis and others.

OAK RIDGE, VA.—The Oak Ridge Telephone Co. has been incorporated with a capital stock of $5,000. The following are officials: C. H. Yates, president, and R. B. Carruthers, secretary and treasurer.

Construction.

HOMER, ILL.—The Homer Telephone Co. will build a new office, with modern equipment.

FORT MADISON, IA.—Workmen have commenced on the second estimate of a $25,000 improvement apportionment of the Iowa Telephone Co. in Fort Madison. The work includes rehabilitation of the entire overhead system, and the establishment of cable system.

ODEBOLT, IA.—Considerable improvements to the Sac County Mutual Telephone Co.'s town lines is to be done within the next two months. All of the main leads of the exchange are to be cabled, and a number of new poles set. The company has reached a decision to keep its poles for its exclusive use, and will not sell space on the poles to the electric light company.

MINNEAPOLIS, MINN.—The Tri-State Telephone & Telegraph Co. is preparing to erect a new exchange building.

CRODELL, OKLA.—The Cordell Telephone Co. is erecting a new line between Cordell and Hobart, Okla., supplanting that now in use. Strictly modern equipment is being installed.

DRUMRIGHT, OKLA.—The Drumright telephone system, owned by the Pioneer telephone company, is rebuilding the exchange offices and installing $30,000 worth of new plant.

MEADVILLE, PA.—The Meadville Telephone Co. intends to install a new conduit system, and double the size of its plant.

Financial.

BOONE, IOWA.—The Boone Township Telephone Co. has increased its capital stock of $1,000.

ROCHESTER, WIS.—At the annual meeting of the stockholders of the Burlington, Rochester and Kansasville Telephone Co., an increase in capital stock, from $10,000 to $20,000 was authorized.

Elections.

SHELBYVILLE, ILL.—Officers of the Queen City & Shelby County Telephone Co., have been elected as follows: John W. Killam, president; L. A. Pauschert, vice-president; C. M. Fleming, secretary and O. W. Walker, treasurer. The company has just closed a prosperous year.

Miscellaneous.

AVON, ILL.—H. F. Townsend has purchased a majority of the stock of the Avon Mutual Telephone Co., and will take over the management shortly.

HEBER SPRINGS, ARK.—J. B. Jackson has purchased the telephone exchange at Quitman from John M. Covey, and will take charge at once.

The L & N Type S Portable Testing Set

Accurate—Rugged—Inexpensive

At no sacrifice of quality or accuracy we are now producing an inexpensive Dial Decade Testing Set. The low price of this set is made possible because of a design which has been carefully worked out to admit of advantageous manufacture of parts in quantities. Further, the design is such that assembling is easily and quickly done. Accuracy and the usual Leeds & Northrup reliability have been retained. Our guarantee is behind every set.

Price $60

Let us Send you Bulletin No. 530. It describes the set in detail.

The Leeds and Northrup Co. 4901 Stenton Ave., Philadelphia, Pa.

THE STANDARD FOR QUALITY

McROY — CONDUITS — CAMP

The Pioneer Manufacturers

Specify either of the above standard makes when writing your underground specifications.

Factories East and West, enable us to figure reduced freight rates, assuring you of the lowest delivered prices without sacrificing quality in any way.

Large stocks of both single and multiple duct constantly carried, thus insuring an early delivery.

Our conduits have been used for twenty-three years. Inquire about us in any city where conduits have been installed.

McROY CLAY WORKS Rookery, Chicago

H. B. CAMP COMPANY New York Pittsburgh Chicago

PLANT BY-PRODUCTS DEVELOPED

FIRE ALARMS, WATCHMAN'S REGISTERS, TIME SERVICE, POLICE PATROL TELEPHONES

GARRISON BABCOCK

TELEPHONE ENGINEER

SUITE 800-20 E. JACKSON BLVD.

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INVESTIGATIONS MADE TO ESTABLISH RATES

VALUATIONS

SERVICE IMPROVEMENT

COST FACTOR REDUCTIONS

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CONSULTING TELEPHONE ENGINEER

Plans, Estimates and Reports
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617 Commerce Bldg. KANSAS CITY, MO.

CEDAR POLES Write for Prices. Prompt Shipments from Wisconsin or Chicago Switching District Yard on I. H. Belt R. R.

TORREY CEDAR CO., Clintonville, Wis.

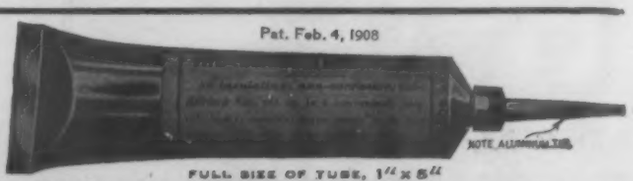
MICHIGAN CEDAR POLES *Complete Assortment at Low Prices*

JENTZ CEDAR & LUMBER CO., : Appleton, Wis.

Insulated Staples
5 Sizes
Pat. Nov., 1900

BLAKE Specialties

STAPLES best for wiring.
TUBE FLUX best Flux for soldering.



FULL SIZE OF TUBE, 1" x 8"

BLAKE SIGNAL & MFG. CO., Write for Samples **251 Causeway St., Boston, Mass.**

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

The Anchor that is making good where all others have failed

THE FAULTLESS ANCHOR CO., Fostoria, O.

Don't make a junk pile out of your old Apparatus!

Don't throw away a perfectly good part if there is only one or two little things which need fixing up. WHEN by repairing your equipment it will make it like new—don't imagine that you have to get the "S. O. S." danger signal out—and order new stuff.

Just remember that this company acts as "repair headquarters." Put it up to men who know your business and save money besides. Pack up your stuff, whether it's one—or twenty parts and ship to the

SUTTLE EQUIPMENT CO., OLNEY, ILL.

"We'll guarantee to please." Write for prices.

USE HEAVY ARTILLERY

if you want lightning protection.

CHAPMAN LIGHTNING ARRESTORS

are the BIG GUNS of the lightning game and are always loaded for bear. Used wherever lines are run.

Manufactured by

MINNESOTA ELECTRIC CO., MINNEAPOLIS, MINNESOTA

WE can supply promptly at economical prices your every requirement of

Bare Copper, Brass and Bronze Wires.
STANDARD C. C. C. Wire (Colonial Copper Clad).
Rubber Insulated Telephone Wires.
Paper Ins., Leaded Cables.
Rubber Ins., Leaded Cables.
Armored Cables.
Cable Terminals.
And Other Cable Accessories.

Write our nearest office for estimates or prices before ordering elsewhere.

Standard Underground Cable Co.
Pittsburgh, Pa.

New York	Philadelphia	Chicago
Boston	San Francisco	St. Louis

"The greater the strain, the better it holds."

Swisher Cable Hangers

Save trouble and money. They combine the best ideas of practical linemen who have tried to overcome the weaknesses and imperfections of the old style hanger.

One of the reasons for their success lies in the Peerless patented double "hook that never comes unhooked."

It will save you money to write for information.

NATIONAL TELEPHONE SUPPLY CO.
Cleveland, Ohio

TELEPHONE BOOTHS
Folding Door, Special and Standard
Interchangeable Unit Office Fixtures and Partitions
Write for Catalog
C. H. BROWNELL, PERU, IND.

Representation Before All Governmental Departments, Bureaus Commissions

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Electrical and Intricate Technical Patents A Specialty

THE "COFFEY SYSTEM"
Meets the requirements of the New schedule of accounts for class A, B, C & D Companies, effective Jan. 1, 1915, by the Interstate Commerce Commission. The most complete and most simple system on the market.
COFFEY SYSTEM & AUDIT CO. - INDIANAPOLIS

FINCH BROTHERS *Wholesalers and Producers*
Duluth, Minn. WHITE CEDAR POLES

Idaho Cedar Poles
Northern Mercantile Co. Ltd.
Resident Producers
Sand Point, Idaho

"Opportunities"

Copy for classified advertising for the current issue should reach us not later than Thursday morning when forms close. Rates for classified advertising will be sent upon request.

"Rebuilt" Telephone Apparatus

and exchange equipment saves you 30 to 50 per cent without sacrificing quality or efficiency.

Switchboards

—Telephones—Apparatus—Protection Equipment—Cable—Everything you need for the installation and operation of a complete exchange—Magneto or Central Energy—of the best and most reputable manufacturers.

Eight Years Successful Operation

of our "Rebuilt" Equipment Department puts it past the experimental stage. Quality and price will make you a permanent customer. Better investigate.

Ask for Our Free No. 78 Bargain Bulletin. Address "Rebuilt" Equipment Department

PREMIER ELECTRIC COMPANY Chicago, Ill.
"REBUILT" when connected with PREMIER means something

Cable Testers

A CABLE TESTER to be a success must work thru high resistance Moisture faults as well as dead shorts, crosses or grounds. Get a Wireless Cable Tester on trial and compare it with any other. Electric Specialty Mfg. Co., Cedar Rapids, Iowa.

Directory Hangers

WE BEG TO DIRECT YOUR ATTENTION to the Universal Wire Loop, an improvement upon the ordinary string loop for hanging up catalogues, directories, telephone books, prices current, etc. Write us for prices and samples. Wire Loop Mfg. Co., 75 Shelby St., Detroit, Mich.

Patent Attorney

ARTHUR KNEISEL—Registered Patent Attorney. Patent causes of every description. Telephone Engineering, Automatic and Semi-Automatic Telephone Work. Public Utility Representation. Room 1056, No. 29 S. La Salle St., Chicago, Ill.

Miscellaneous

What is it costing you to clear your trouble? Do you keep a record of Batteries, Auto Mileage or Trouble Man's time? My record tells it all at a glance. Loose leaf at $3.50. Address: F. A. Bowdle, Cerro Gordo, Illinois.

Plant Wanted

WANTED—To buy a small telephone plant. Price from $3,000 to $10,000. Please give full particulars and address No. 2177, care TELEPHONY.

Position Wanted

WANTED—Position as troubleman for exchange of 300 to 600 subscribers. Am efficient, clean habits, and can give best of reference. Address 2171, care TELEPHONY.

WANTED—Position by a college graduate in Electrical Engineering. Two and one-half years in charge as general manager of independent telephone system where now employed. Experienced in other branches of public utility work and in accounting. Wishes to get connected with a company offering larger opportunities. Can give best of references. Address No. 2182, care TELEPHONY.

POSITION WANTED—By good, all-around telephone man, who understands telephones, switchboards, construction, trouble, etc.; refined and sober; references if desired. Address No. 2179, care TELEPHONY.

WANTED—Trouble work by cable splicer in northeastern Indiana. Address 2186, care TELEPHONY.

WANTED POSITION—By experienced lineman, repairman and installer; common battery and magneto systems. Address 2188, care TELEPHONY.

POSITION WANTED—By telephone operator; now employed; can give good reasons for desiring change. Address 2184, care TELEPHONY.

Telephone Supplies

WE ARE JOBBERS. Get our prices on telephones, wires, pins, brackets, poles, cross arms, glass insulators—pole line hardware. Indianapolis Elec. Supply Co., Indianapolis, Ind.

CONSTRUCTION SUPPPLIES—Anything you need for your construction work can be ordered from us at prices that can't be beat. Doubleday-Hill Elec. Co., 721 Liberty Ave., Pittsburgh, Pa. Southern Warehouse, 727 13th St., N. W., Washington, D. C.

For Sale

FOR SALE CHEAP—Drops for the following makes of switchboards: Chicago Telephone Supply Company, Stromberg-Carlson, Eureka, North, Fiske-Newhall, Sterling and Swedish-American. Will sell drops separately or boards complete. Save money by writing for prices. Care 2033 TELEPHONY.

FOR SALE—Telephone plant in eastern South Dakota of 320 phones. All in good shape, consisting of both local and rural lines and standard make phones. Kellogg double suspension 100 line magneto board, automatic transformer. All constructed within last eight years. $12,000 cash and $5,000 on approved security for 3 years. Address No. 2181, care TELEPHONY.

FOR SALE—On account of cutting over to "Common Battery" we have the following for sale at low prices, delivery any time after October 1st:

1 Western Electric Toll Switchboard, 25-line capacity fully equipped, cabinet style, used one year, good as new.
3 Vote-Berger Switchboards, fully equipped, 200-line each, in good condition.
600 Magneto Wall Telephones, good condition, Kellogg, Western Electric and Cracraft-Leich make, mostly 1,000 ohm, some 1,600 ohm.
100 Magneto Desk Sets, mostly Kellogg, some Western Electric and Cracraft-Leich, 80 and 1,000 ohm.
2 Warner Pole Changers.

If interested please write us fully; we will close these out at the right price. Barron County Telephone Company, Rice Lake, Wis.

FOR SALE WHILE THEY LAST.

Kellogg 30-42-54 and 66-cycle harmonic ringers, in first-class condition, each.....$1.50
American No. 2 large round type repeating coils, in first-class conditions, each..... 1.50
American No. 18 repeating coils, each..... 1.00
American No. 2 switchboard cord weights, each..... .05
American solid back transmitters, each..... .50
Stromberg-Carlson solid back transmitters, each..... .50
Stromberg-Carlson No. 1 transmitters, each..... .25
Stromberg-Carlson transmitter arms with induction coil and hook switch in base, each..... 1.00
80 and 1,600 ohm ringer movements of various makes, each.. .15

NORTH-EAST KANSAS TELEPHONE COMPANY,
HIAWATHA, KANSAS.

FOR SALE—Telephone exchange in growing city of 1,000 population. City all in cable, cedar poles all painted, twelve distributing pole construction, 30,000 feet copper-clad thin drop wire, Western Electric distributing frame, capacity 250 pair; 200-line Swedish-American board equipped with pole changer, generator, transmitter key, night alarm; three sets repeating coils; breast type transmitter; all telephones compact Western and Swedish; 40-miles toll lines running to surrounding towns; farmer lines connect at city limits on yearly switching fee in advance; Bell long distance connection with pro rate to my points. Annual gross income $2,954. Price of plant $10,000, half cash and balance on easy payments with interest. Or would consider an exchange for a good farm of equal value. Reasons for selling, have other business. There is no better plant in the state, and there is none as cheap. Address W. W. McCurday, owner, Owensville, Mo.

Help Wanted

WANTED—Troubleman magneto plant, 500 telephones. No booze fighter or cigarette fiend. Must be industrious and steady. Right place for right man. State salary (must be low to start) and references in first letter. Benton Independent Telephone Co., Prosser, Wash.

Ribbons for Calculagraph

Our price 25c each—$2.50 dozen. At first they didn't believe they were any good at half price. Real reason—no competition. Over 1,500 customers now. HORNEY & COMPANY, Lafayete, Ind.

Telephone Plant Construction

WHEN YOU BUILD A NEW EXCHANGE or rebuild your old one, you will save money by consulting with us. Correspondence solicited. Home Electric Construction Co., Macomb, Ill.

Test Connectors

WHY NOT GET THE BEST, as long as it costs no more? N. C. Test Connectors have exclusive advantages. Write if interested. Schutz Mfg. Co., 2225 Ravenswood Ave., Chicago.

Aerial Cable Rings
C8, D9, E10, N9, S25.
Alligator Wrenches
R9.
Anchors, Guy
C47, E20, D10, F3, G8, J5, M12, W20.
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Arms and Brackets (for holding telephones)
A13, C38, S38.
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A10, B10, K6, S18, W20.
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Asbestos
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T3.
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"Buyers" Reference Index

The letter with accompanying number indicates the name of advertiser as given in full in the Alphabetical Index to Advertisers, on the opposite page. *When making known your wants* to any company listed herein, please mention TELEPHONY.

Warner Pole Changers

20 Years in Service; Over 20,000 in Daily Operation

The first successful pole changer made.

It revolutionized "ringing conditions" in the telephone field; and set such a high standard then that it has never been equaled.

Economical and reliable, it has stood the test of long service, and is pronounced the one perfect pole changer by the leading telephone men of the country.

Let us solve your ringing problems.

WARNER ELECTRIC CO., Muncie, Ind.

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

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Patented Nov. 15, 1904
No. 2521

IF YOU HAVE A FRANKEL TESTING CLIP IN "YOUR" KIT YOU ARE PREPARED TO LOCATE TROUBLE

You can make a "test" in one-tenth of the time required to skin a wire for one, and neither does the wire or insulation suffer any damage.

The point pierces the insulation and makes a perfect test. Can be used constantly, yet the point will never dull.

Prices:

No.	Less than 12	12 lots	100 lots	500 lots	1,000 lots
2521	20c	12½c	11c	10c	9c Ea.

Net F. O. B. New York, from your supply house.

Frankel Display Fixture Co.
733 Broadway New York City
or Western Electric Co., All Branches

McMEEN and MILLER
(Incorporated)
Samuel G. McMeen Kempster B. Miller Leigh S. Keith
TELEPHONE ENGINEERS
1454 Monadnock Block CHICAGO
407 Electric Building CLEVELAND

D. C. & WM. B. JACKSON
CHICAGO Peoples Trust Bldg. ENGINEERS BOSTON 248 Boylston St.
Plans, Specifications, Supervision of Construction
General Superintendence and Management
Examinations and Reports
Financial Investigations and Rate Adjustments

CHARLES S. WILSON
PATENT ATTORNEY
2054 Continental and Commercial Nat. Bank Bldg.
CHICAGO, ILL.
Formerly Assistant Examiner in the United States Patents Office

"SAFETY FIRST"
In Climbers and Connectors
means
"RED DEVIL"
tools. The same is true when it is a matter of economy first and "good work" first.
It will pay to let us prove it. Write for free tool booklet while you think of it.
SMITH & HEMENWAY CO., Inc.
140 Chambers Street New York City

JOHN A. HARRISON
Consulting Traffic Engineer
Operating Instructions Supervision
Methods and Costs Switchboard Requirements
LIMA, - - - - - - OHIO

EDWARD E. CLEMENT
Attorney at Law and Electrical Engineer
PATENTS
Soliciting, Consultation, Reports, Opinions
Office: McLachlen Building, 700 Tenth St., Washington, D. C.

Write for this New Yesbera Book

IT is just off the press, and will tell you a dozen interesting things about the *new* Yesbera Folding Door Telephone Booths.

YESBERA
TOLEDO

THIS is the day of folding door booths, and in our new model we believe we have the finest booth of this type so far developed. The most important point of superiority in the Yesbera booth is in connection with the mechanism of the door. It does the work called for to perfection—and there is absolutely nothing that can get out of order. In our new booklet we show a "floor plan" so that you can see just how this mechanism works. We also tell about the construction, materials, operation, sound proofing and specifications. Everyone interested in telephony should have a copy so as to be fully posted on the latest ideas in booth construction. Fill in and mail us the coupon and we will gladly send you a copy—whether you intend to buy a booth or not.

YESBERA MFG. CO.
2308 Albion St., Toledo. Ohio

Coupon

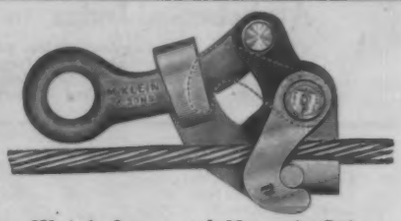
The Yesbera Mfg. Co.,
2308 Albion St., Toledo, Ohio

Without any obligations on our part kindly send printed matter and prices on Yesbera Folding Door Booths.

Name .....

Address .....

You Should Have a Copy of Our NEW CATALOG of



Klein's Improved Haven's Grip

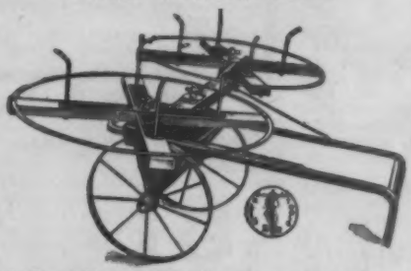
KLEIN Tools (Just off the Press)

Sent to You on Request

Filled with illustrations, descriptions and prices. —A very convenient booklet to have on hand at all times. Every telephone company manager and purchasing agent should have a copy. Write for it.

Mathias Klein & Sons
Canal Station 34 Chicago, Illinois
Sales Representatives
Domestic and Canada: SURPLESS DUNN & CO., 78 Murray St., New York.

THE WASSON REEL



A Great Time and Labor Saver for Telephone and Electric Light and Power Use

With Insulated Handles

OUR EXTRA HEAVY DOUBLE GALVANIZED WIRE INSURES
HIGHEST EFFICIENCY.
LONGEST LIFE.
LOWEST COST OF UPKEEP.

It's easy to determine, TEST IT.

As wire will test best, so also will it last best and give better satisfaction while it lasts.

We guarantee our wire to conform with all standard specifications as well as to be satisfactory to the purchaser.

IT'S THE ONE BEST PROVEN BY TEST.—*TRY IT.*

Handled by most representation jobbers and supply houses.

Write for samples, test and compare.

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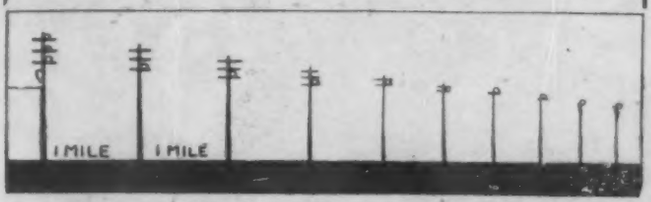

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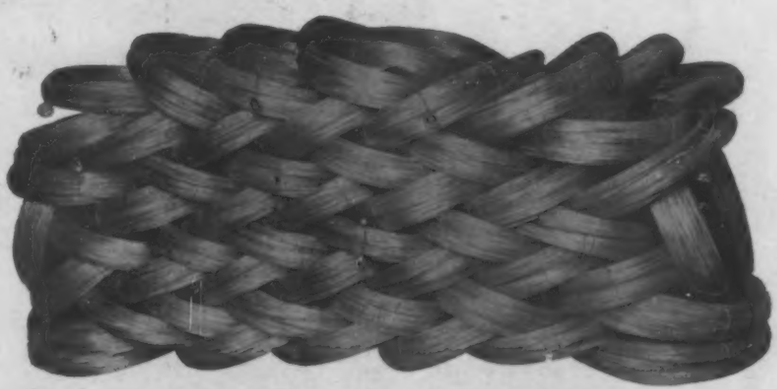

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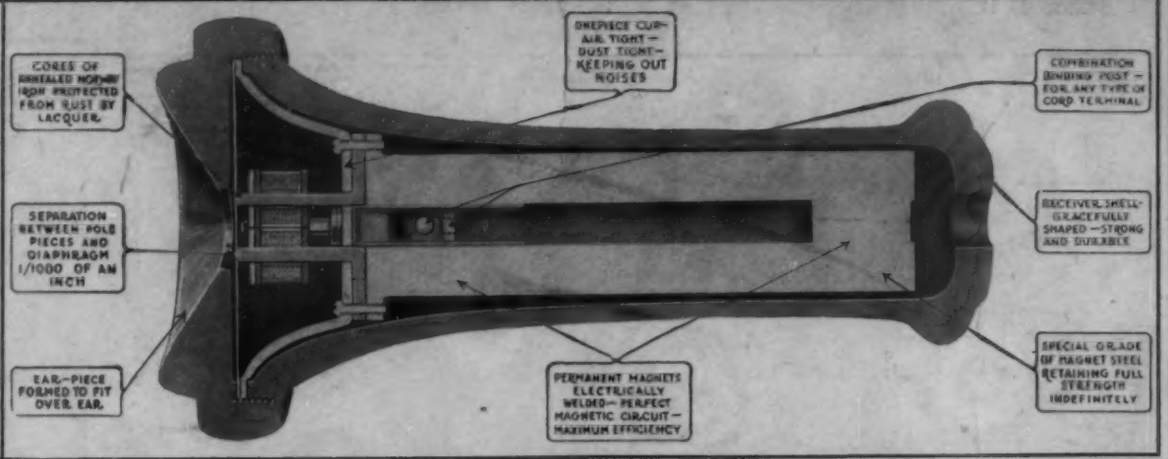
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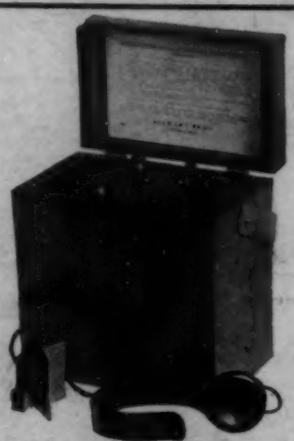

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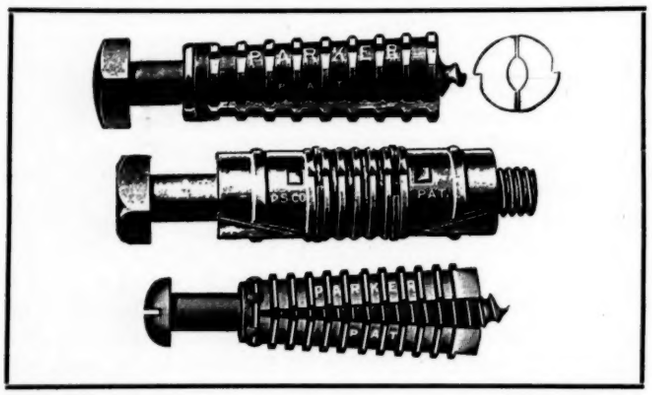
Convention: Indiana Independent Telephone Association, Indianapolis, September 15 and 16

Parker Expansion Bolts.

An expansion bolt provided with lugs to prevent it from turning has recently been developed and placed on the market by the Parker Supply Co., 527 W. Forty-fifth street, New York. The reversibly directed projections shown in



Parker Lag Screw Type, Machine Bolt Type and Screw Anchor.

the cross section in one of the accompanying illustrations, are said to prevent the shield from turning in the hole. The circumferential ridges, the manufacturer points out, insure a proper resistance to stress in the direction of the line bolt. The steel spring band, shown in another illustration, holds the halves of the bolt together and on account of its flexibility allows the shield to expand freely. A feature of the Parker bolts, which will be appreciated by its users, is the provision of little pins on the outside of the nuts which lock into openings in the shield, preventing the shield from coming apart and thus eliminating re-assembling.

The outside of the Parker machine bolt type is ribbed over its entire length. These ribs, together with the reversibly directed projections, are said to not only prevent the shield from turning in the hole, but enable it to obtain a much better and more substantial grip. Both the lag screw and machine bolt types are made of malleable iron.

The Parker screw anchor is made extra heavy at the ends to increase its holding power. At the base the anchor is joined by two breakable connections which prevent the anchor from taking a cork-screw twist when subjected to the torsion produced by the entering screw.

The Parker Supply Co. also manufactures several types of toggle bolts, brick and stone drills and other engineers' and sheet-metal workers' specialties. Further information and descriptive literature may be obtained upon application to the company.

Matthews Anchors Guaranteed Against Breakage.

W. N. Matthews & Brother, of St. Louis, Mo., recently conducted an investigation as to the number of Matthews anchors which are broken either in transit to their customers or in handling by the men before or during installation. The number of instances in which the helix casting was broken was so much under one per cent. as to make this possibility practically negligible. No case was found where the malleable eyes were broken or where the threads on the malleable eyes had stripped under strain.

As a result of this investigation, W. N. Matthews & Brother have decided to replace any casting, whether eye or helix, of a Matthews Scrulix anchor that has been broken in transit to the customer or by the customer's men before or during installation, free of cost. They further guarantee that the threads in the helix and the eye of the five, six and seven-inch anchors are equal in strength to the rods to which they are attached.

The following facts, Matthews & Brother contend, make the purchase of Matthews Scrulix anchors a can't-lose-proposition: The fact that Matthews Scrulix anchors have no steel in them, the eyes being made of the best grade of malleable iron galvanized; the fact that the rods are made of ungalvanized Armco iron (guaranteed to outlast galvanized steel rods of the same cross-section) and that the helices are made of the best grade of gray iron; plus the further fact that the increase in sales and a perfection in manufacturing methods have brought about an average reduction in price of 25 per cent.

The New Kearns 1,000-Pound Motor Truck.

In a recent interview M. C. Kearns, president of the Kearns Motor Truck Co., of Beavertown, Pa., said in part:

"The motor truck is being more and more recognized as something more than a luxury. Its perfect delivery and economical upkeep costs, are indeed an inducement, but on top of this is the fact that the motor truck is a much better advertisement than any other sort of conveyance. To illustrate my point:

If you and I were walking along the street and saw a car whose appearance was strange, or even familiar, wouldn't we comment on that car and try to guess what make it was? And if the name stood for quality, wouldn't we admire the fellow that owns the car, for his wisdom in making so wise a purchase?

Just so it is with the motor truck. Telephone companies have just recognized this valuable asset—the motor truck. When you and I see a motor vehicle on the street with an advertisement lettered on it, we read it with more interest than if it were on a buggy or a horse-drawn conveyance. And that's why the motor truck is proving so good an advertising medium. Call it environment if you will, but nevertheless it is an indisputed fact that these points are true."

Further on in the interview, Mr. Kearns was asked the question, "How will the motor truck and motor car be of service to the railroad and telephone companies?" He replied: "In these days, when the storms are threatening, the lineman gets his tackle ready. Just as soon as the first trouble report comes in over the wires to 'Central,' the lineman is ready. All that he needs to do is to jump into the truck, loaded with the necessary supplies and tools and drive to the scene of operations."

"Or," said Mr. Kearns, "if you want to use a truck for the lighter work, don't purchase a big, heavy car, but buy a small light car, like the Kearns. It will see you through the hard weather."

The Kearns Motor Truck Co. has recently placed on the market a 27 horsepower truck of 1,000 pounds' capacity, which is especially adapted for the use of telephone companies in construction and repair work. This truck has three speeds forward, one reverse, selective sliding gear, central control, and is equipped with an electric starter, Disco driven by a silent chain, encased and dustproof. The wheel base is 107 inches and the weight of the car is 1,000 pounds. The engine is of the Lycoming type, four cylinder, four cycle and water cooled. The Kearns truck

is furnished either with a closed body or an open body with side curtains. The size of space back of seat is 44 by 60 inches, in addition to 14 inches of space under the seat.

In a letter addressed to the Kearns Motor Truck Co. shortly before his death, Elbert Hubbard highly indorses the Kearns motor truck.

The factory of the Kearns Motor Truck Co., at Beavertown, Pa., is operated on much the same plan as the Roycroft shops, at East Aurora, N. Y.—Elbert Hubbard's great institution. Mr. Kearns also gives his employes a share of the profits and all of them are stockholders in the company.

Further information relative to the Kearns motor truck will be sent to interested parties upon request.

Paragraphs.

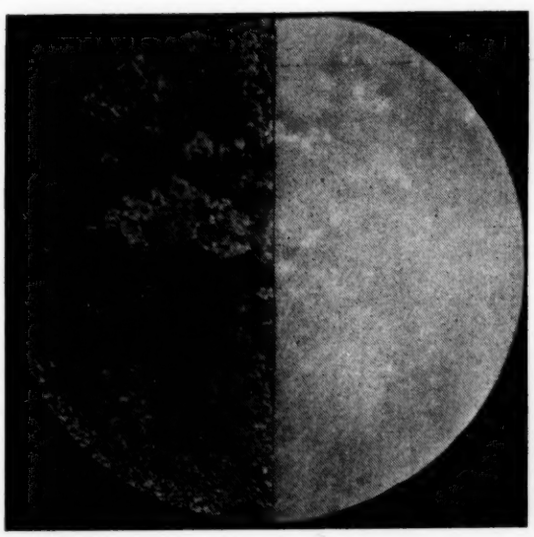
The Garford Mfg. Co., of Elyria, Ohio, is now established in its new branch headquarters in Kansas City, Mo. The street address is 1322 Main street, the location being less than two blocks from the main business district. The company recently received an order from the Center Telephone Co., of Olpe, Kan., for complete new central office equipment.

The Yesbera Mfg. Co., of Toledo, O., has just prepared and issued to the trade an attractive folder descriptive of Yesbera folding door booths. This folder presents a number of Yesbera booths, their mechanism and operation and gives a detailed description of their construction. Copies of this folder will be sent to interested companies upon request.

The American Rolling Mill Co., of Middletown, O., has issued a booklet entitled "Next to Excellence is the Appreciation of It," containing some expressions of the estimate placed upon Armco-American ingot iron by those who are using it. In this booklet are reproduced some 30 testimonials received from users of Armco iron for various purposes. Copies of the booklet may be obtained upon request.

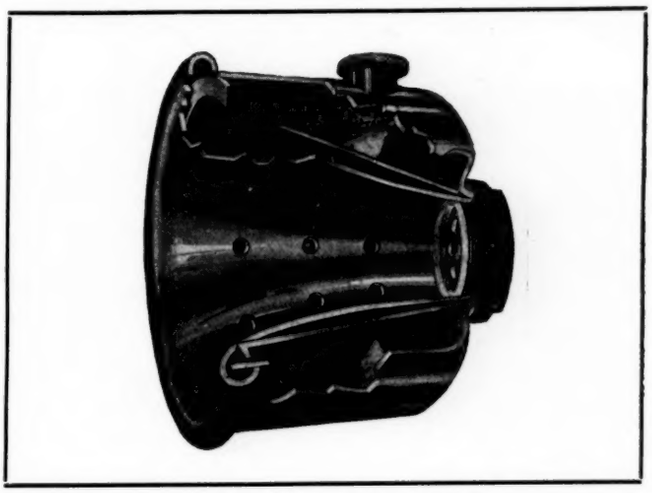
Sanitary Transmitter Mouthpiece.

It is contended by many that the ordinary transmitter mouthpiece is a source of danger as a common carrier of disease. Cultures made by Drs. J. H. Black and Jewel Daughety, of the Southern Methodist University, Dallas, Texas, show the danger of infection from the ordinary transmitter mouthpiece.



Infection from Mouthpiece—Absence of Infection in Aseptifone.

To overcome this danger, a sanitary mouthpiece, known as the Aseptifone, has been devised and placed upon the market by E. M. Jenkins, M. D., Ph. G., of Italy, Texas. This transmitter mouthpiece, a sectional view of which is shown in one of the accompanying illustrations, consists of a plurality of shells. The inner shell has a threaded portion for attaching to the transmitter. An annular flange extends laterally from the outer end of the inner shell so as to confine and embrace the other shells. The outer shell has provision for storing a disinfectant within it. An intermediate shell has means for admitting the disinfecting fumes from the outer shell, while the inner shell is constructed so as to disseminate the fumes. The construction is clearly shown in the illustration.



Sectional View of Aseptifone.

The micro-protographs reproduced in one of the accompanying illustrations were made by the Millwee X-Ray Laboratories, Dallas, Texas, from the cultures of Drs. Black and Daughety, of the Methodist University. The left half of the illustration shows the heavy infection in the ordinary telephone mouthpiece, while the other half shows the absence of infection in the Aseptifone just described. Further information relative to this device may be obtained upon request.

Annual Outing of Stromberg-Carlson Employes.

Saturday, August 14, was the day set aside for the ninth annual outing of the employes of the Stromberg-Carlson Telephone Mfg. Co., of Rochester, N. Y. The day turned out to be ideal for an outing and at 8:30 a. m. 500 merry picnickers started from the company's main office for Manitou Beach, the place which had been selected for the scene of pleasure. Manitou Beach is one of Rochester's popular summer resorts and is located on Lake Ontario about 14 miles from the heart of the city.

The program planned for the day included athletic events of all kinds which were run off soon after the arrival at the grounds. The features of the day, which stirred up considerable interest, were the two ball games. The teams were selected from different departments of the organization. The first game between the Blues and Reds were begun at 10:30 a. m. Roy McCanne captained the Blues and J. S. Gibson had the Reds in charge. A very exciting game was played, the Blues defeating the Reds by a score of 24 to 21.

At 2 p. m. the Office team played the Factory team. The captains of these teams were C. H. McConnell and C. Dassan, respectively. That the game was a good one is evidenced by the fact that at the end of the fourteenth inning neither team had been able to score the deciding run and the game was called as darkness was fast creeping on. The score was 7 to 7.

The annual outing of the Stromberg-Carlson company is a day that is looked forward to by the entire organization. A band was in attendance all day and there was dancing in the evening.

Phoney Bill, a Golf Enthusiast.

Even Phoney Bill in his untiring efforts as a "Quality Apparatus" booster, finds time to play a few holes of golf now and then. The accompanying reproduction from the September blotter calendar of the Stromber-Carlson Telephone Mfg. Co., of Rochester, N. Y., shows Phoney Bill at the first tee with his driver in hand, presumably measuring the distance with his keen eyes preparatory to making his first shot. Bill is dressed in the latest sporting attire, for he believes in being up-to-date in clothes as well as in telephone apparatus and equipment. With his usual "smile that won't come off," Phoney Bill says: "Use Quality Apparatus" and your telephone troubles are over.

Phoney Bill Ready to Make His First Shot.

Book Reviews.

How to Make a Transformer for Low Pressures, by Prof. F. E. Austin, Hanover, N. H.; 14 pages, 4½ ins. by 7 ins., with illustrations. Price, paper, 25 cents.

For experimental purposes, special transformers are sometimes desired which will give a variety of pressures. This booklet gives detailed instructions as to the construction of a transformer for stepping down the voltage from 110 to as low as 8. The various connections of the windings for obtaining different voltages are explained. It is stated that performance of transformers built according to these instructions has been remarkably good.

Directions for Designing, Making and Operating High Pressure Transformers, by F. E. Austin, Hanover, N. H. 46 pages, 4½ ins. by 7½ ins. with illustrations. Price, paper, 50 cents.

In this booklet, points relating to the design of a transformer are first taken up, after which the practical calculations involved are considered. Details of the construction of a three-kilowatt, 20,000-volt transformer are then presented, sketches being used to make clear the text. Estimates of the costs of materials entering into the construction of transformers according to the design presented are given.

Purchasing; Its Economic Aspects and Proper Methods, by H. B. Twyford. Published by D. Van Nostrand Co., New York; 236 pages, 6 ins. by 9 ins. with charts and diagrams. Price $3.

Expenditures are necessary in every business to carry on its activities. Many books have been written as to the proper use and care of the materials after purchasing, but very little has appeared relative to the economies which may be effected by efficient methods in the purchasing of materials, goods and supplies. It is of these methods that this book treats.

In order to direct attention to the importance of efficient buying, a chart showing the results of inefficient purchasing as compared with competent buying is presented together with a discussion of the principles of purchasing. The importance of good buying in every concern, no matter how small, is emphasized by pointing out that it is a component part of the activities of the concern as a whole. The ability to buy the best from a utilitarian point of view, for the lowest price, is stated to be the first step in the profits.

In the discussion of the ethics of buying, the relations between buyer and seller and their obligations are fully considered, together with practices which should be discontinued. The purchasing agent should be possessed of certain fundamental facts and these are shown diagrammatically. The main divisions of his work with the principal details of each division are then pointed out and his relation to the heads of other departments discussed.

The functions and activities of a purchasing agent are considered under these four heads:

The consideration of purchasing as a whole, its various phases and the manner in which it can be divided to obtain the most efficient results.

The organization of the personnel of the department to take care of the work of each division.

The system or method of procedure to be followed by employes in doing the work allocated to them.

The actual operation with the necessary forms for carrying out the work.

A chapter on stores and their keeping is of interest as considerable information is furnished relative to the proper methods of receiving, keeping and dispensing store materials.

The concluding chapters of the book consider purchasing systems and methods used by various kinds of concerns, both large and small, which illustrate the practical application of the principles previously discussed.

The book is well illustrated with diagrams and charts which clearly show the points brought out in the text. Telephone companies, with their purchases in so many varied lines, will find considerable of value in this work.

P. B. X. System in a London Department Store.

The P. B. X. switchboard in the department store of Selfridge & Co., London, Eng., has recently been enlarged to nine positions, with 60 lines and 265 extensions. As typical of the methods adopted in dealing with telephone orders, D. H. Kennedy, in a paper presented before the Telephone & Telegraph Society of London, describes the events which take place in the case of a call for the Selfridge store, as follows: The subscriber, asking for "Gerrard 1," is connected to the Selfridge operator who replies, not by saying "Hello!" or "Who are you?" but by using the word "Selfridge." The caller then usually asks for the department desired. The operator replies, "Do you wish to give an order?" If so, the connection is made with a telephone order line.

The telephone order clerk is provided with two lines, an incoming line over which the customer's demands are received, and an outgoing line which enables the order clerk to communicate with any department in order to settle any matter of doubt. The customer's orders are written down on appropriate forms and passed to the departments for execution. A customer inquiring about an article purchased, on a visit to the stores, is connected direct to the department concerned, and calls for the hair dressing, manicuring, and drug departments are put through direct.

The Selfridge exchange operators each handle about 900 calls per day. In their new department on the south side of Oxford street, Selfridge & Co. have introduced a new feature, which has been widely advertised. Ladies wishing to give orders which refer to a number of departments are provided with comfortable chairs and tables, and the services of assistants, and at their elbows are placed desk telephones. The assistants take particulars of the articles required, samples are brought immediately for the inspection of the customer, and if she desires to consult with her housekeeper or cook on any